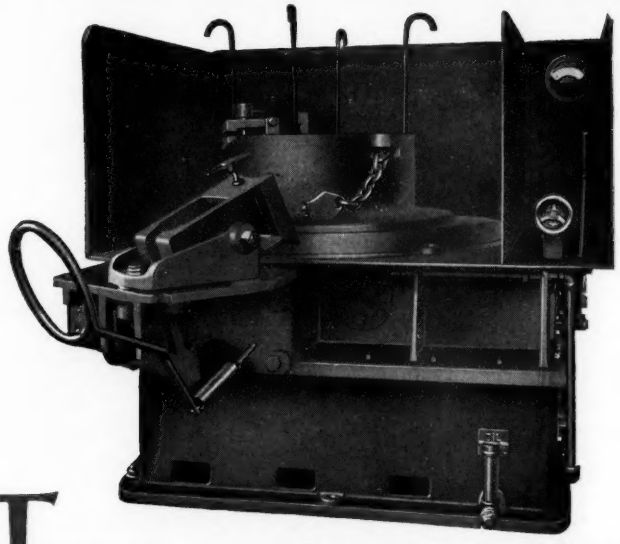
WIRE
& WIRE PRODUCTS

VAUGHN



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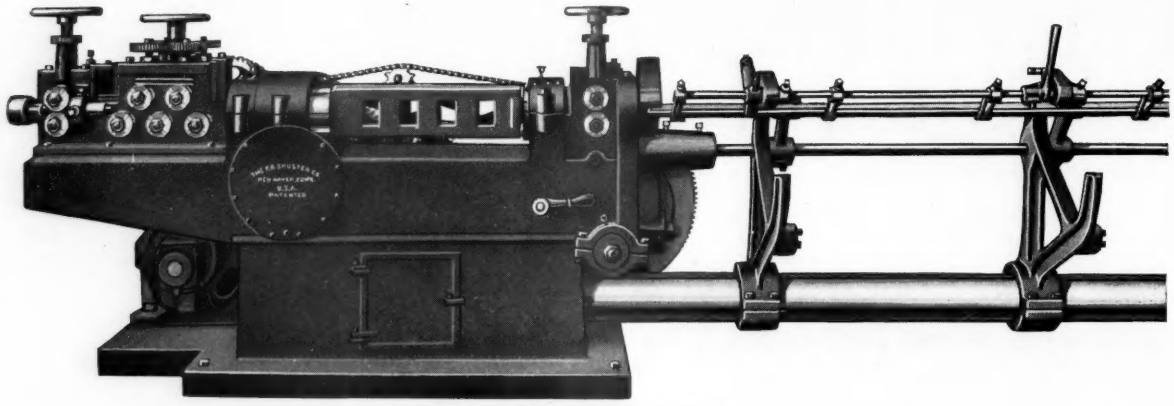

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Booklet of Installation and Production Figures will be sent on request.

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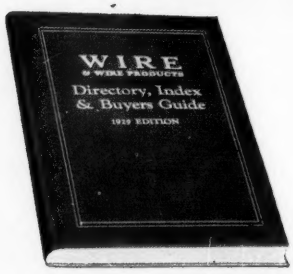

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Index & Buyer's Guide

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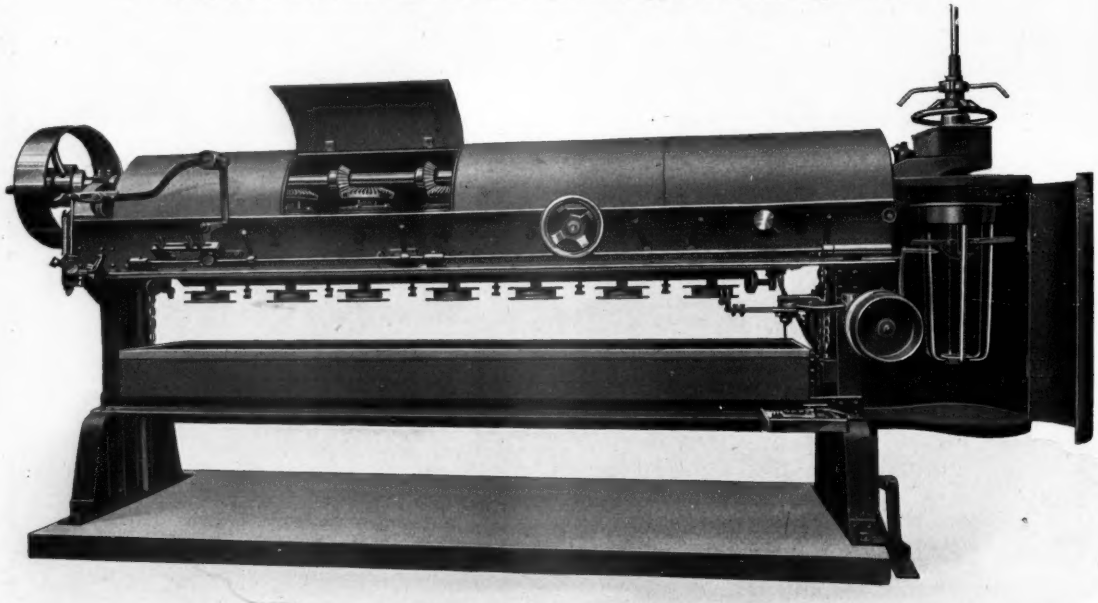

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IN these days of mergers and consolidations let us not lose sight of the part played by the small factory in our modern industrial scheme. In its behalf there have recently come some heartening words from authoritative sources.

* * *

According to Mr. E. W. McCullough, manager of the department of manufacture of the Chamber of Commerce of the United States: "There is no passing of the small factory equipped with modern machinery and strategically located. The day of the big, inflexible plant, facing intense competition in distribution as well as production, seems to be on the wane. The cry that the big fish are eating the little ones sounds less alarming. Already many of the newer and the best managed industries are getting away from building very large units and leaning more strongly toward those commensurate with the market to be served and building them near it."

And the President of the Otis Steel Company, Mr. E. J. Kulas, is quoted in "Nation's Business" as saying that the trend of industry today is toward decentralization and smaller units which are more flexible.

* * *

An obvious business advantage is enjoyed by the individual manufacturer who is close to every detail of his plant operations and costs, who knows his sources of supply, who is personally acquainted with his best customers. In these days of a seller's market he is entrenching himself firmly, if he is wise, against the possibility of keener competition in the future.

We would add just one suggestion to make his position more secure—that he read his trade press regularly to keep informed about the developments that concern him most, and in the case of the industry we are addressing this simply means that he begin by reading *Wire & Wire Products* each month.

The Publishers

WIRE & WIRE PRODUCTS

A monthly publication devoted to wire drawing and wire forming

Vol. 4 March, 1929 No. 3

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Widia Metal and Wallramite Used Exclusively in These Dies

Why is it that European competitors are able to undersell the American wire manufacturer in spite of heavy tariff duties and transportation charges?

HERE ARE A FEW REASONS

Reduced Die Costs

They have succeeded in reducing die costs to a minimum with UN-WIDIA and WALLRAMITE dies, which in Continental practice have replaced the chilled iron, steel, and in the case of hard wire, diamond dies.

Increased Production

Production per machine has been increased from 25% to 35% due to increased drawing speed and continuous drawing with UN-WIDIA and WALLRAMITE dies.

Finer Quality Wire

The wire drawn with these dies is of a much finer quality and is made at a decreased cost.

Longer Die Life

With better quality of wire from the coarse wire machine, the diamond dies last twice as long on size when redrawing fine wire.

Reduced Labor Costs

Labor costs are reduced in direct proportion to increased machine production.

Reduced Manufacturing Costs

Die room costs are cut 75% or more and many of the usual cleaning operations are eliminated by the use of UN-WIDIA and WALLRAMITE dies.

Lower Die Costs

Considering the tonnage of wire drawn, the die cost is actually lower than that of chilled iron and steel dies.

UN-WIDIA and WALLRAMITE dies are manufactured and sold exclusively by the

Union Wire Die Corporation

Manufacturers of diamond and alloy metal dies

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WIRE & WIRE PRODUCTS

Vol. 4 MARCH, 1929 No. 3

New Definitions Proposed For Rods, Bars, Coils and Wire

Tariff description of round steel and iron material receives detailed consideration by Interstate Commerce Commission

IN the course of its report made public on January 21 (Investigation and Extension Docket No. 3029), the Interstate Commerce Commission found that proposed increases in freight rates on iron and steel rods between points considered in Eastern territory were unjustified. The following selections from the reports of the commissioners disclose the point of view underlying the decision and present some interesting facts about wire and related products.

Rods are described in the governing tariffs as follows:

"Rods, bolt, nail, rivet and wire (iron or steel), in coils (not in straight lengths), unfinished, not drawn through a die, not lighter than No. 8 gauge nor greater than one and one-quarter inches in diameter, which can be transported in open cars without damage from exposure to weather, in carloads, minimum weight 56,000 pounds."

Under recent decisions it is immaterial whether the rods be round, rectangular, or hexagonal in cross section.

In the Standard cases, Division 1, said among other things:

The subject matter of this controversy is the raw material from which complainants manufacture their finished product, bolts and nuts. This material reaches the complainants in the form of straight strips, from 16 to 20 feet long, or in coils containing from 150 to 300 linear feet. Samples submitted at the hearing were either round or rectangular in cross-section, the shape as well as the diameter varying with the size of the bolts or nuts to be manufactured.

Rod Shape Immaterial

The diameter of the bars with circular cross-section is 3/8 inch and greater. The sizes which are most used of the bars rectangular in cross-section are 5/8 by 1/4 inch, 3/4 by 3/8 inch, and 7/8 by 1 7/16 inches. The rectangular shapes are sometimes called nut flats. Most of the material used is in straight lengths, one complainant using this kind exclusively.

It is all obtained by the same process, namely, by passing a steel billet, while hot, through rolls. The resulting product comes through in straight bars, or it may be wound into coils while still hot. When in coils, this product comes under the various descriptions of rods, above quoted, and moves on the billet rate.

When in straight lengths defendants differentiate the rods under the name of bar steel or steel bars, upon which the rates on manufactured iron and steel articles are applicable, which are approximately the first-class rates. In other words complainants' materials when shipped in straight lengths take a higher rate than the identical article when shipped in coils, although the cost is the same per pound in each case."

About 4,000,000 tons of rods are produced annually, of which about 3,670,000 tons are used in the manufacture of wire and wire products, chains and rivets, and about 330,000 tons in the manufacture of bolts and nuts. Of the total production about 2,000,000 tons are manufactured into finished products at point of origin and about 2,000,000 tons moved by rail to some other point for such manufacture.

The increase proposed by the carriers average about 35 per

cent and amount to over $600,000 a year. They will fall heavily on manufacturers which are not self-contained, that is, do not produce their own supply of rods but rely upon inbound rail transportation for their supply of this raw material.

Rods, as the term is understood in the iron and steel industry, are always shipped in coils, never in straight lengths. They range in diameter from No. 8 gauge (about 1-6 inch) to 1¼ inches, 85 per cent being No. 5 gauge (0.207, or about 1-5 inch in diameter), and over 90 per cent being round and about 10 per cent being hexagonal or rectangular in cross-section.

About 6,000,000 tons of bars are produced in the United States annually, of which about 5,800,000 tons are a finished product, in so far as the iron and steel industry is concerned, and about 200,000 tons are used in the manufacture of bolts and nuts.

Methods of Making Rods

Bars, as the term is understood in the iron and steel industry, are usually shipped in straight lengths, rarely in coils. They are made in many shapes —round, half-round, oval, half-oval, hexagon, octagon, flat, and angle—and range in widths or diameter from No. 8 gauge to 3 inches, although the production of sizes smaller than ¾-inch is very small. Rods are made principally on rod mills, bars principally on merchant mills.

Rods are also made to a small extent on the merchant mills, and both rods and bars to a small extent on the so-called interchangeable or combination mills. The annual production of rods of all shapes made on a merchant or combination mill is about 75,000 tons.

As made on a rod mill, the rod starts with a four-inch billet which is broken down through a succession of rolls. It comes out of the last roll at the rate of 3,200 feet per minute or about 40 miles an hour. As it comes out of the last roll it is coiled into reels in pieces about one-third of a mile long, and is not inspected for defects such as fins and pipes or departures from gauge. The tolerance is 2-64 of an inch, that is, the rod may be 1-64 of an inch over or 1-64 inch under the size ordered by the customer and still come within the usual commercial acceptance of the specified size.

Merchant Mill Process

As made on a merchant mill, the bar starts with a 1¾-inch billet which is likewise broken down through a succession of rolls. It comes out of the final roll at the rate of about 1,500 feet per minute. It is then gauged and inspected, put through straightening rolls and after straightening it is cut, generally to exact specified lengths, and the smaller sizes are bundled. Bars according to sizes are rolled to an accuracy or tolerance limit from .005 to .011 inch.

The bar is about three times as accurate to gauge as the rod of corresponding size made on a rod mill. On the merchant or combination mill, the rods are passed through the final roll at substantially the same speed as the bars. The rod then goes through to the coiler and is shipped in that form while the material from which the bars are taken goes to the cooling bed in straight lengths where it is sheared and sorted and the cropped ends, poor material and imperfect lengths are removed.

Average Cost and Scrap Loss

Rods, whether made on a rod, merchant or combination mill, are processed at destination before being made into the finished product. The cost of processing which includes pickling, liming, drawing and rerolling, or straightening, shearing and sorting, regardless of shape preparatory to fabrication varies from $2 to $3.50 a ton. The scrap loss after arrival at destination is about 10 per cent in the manufacture of wire and wire products and ranges from 30 to 50 per cent in the manufacture of bolts and nuts.

Bars are not processed at destination, but are used just as they come from the cars. For example, in making bolts they are merely cut to size and put through the heading and threading machine, and in making nuts they are put directly into the machine, and there is virtually no scrap loss. The bolts go out to the trade with the shank carrying the identical finish as did the bars received from the merchant or combination mill.

A rod can be distinguished from a wire by the fact that it has not been drawn through a die, but this is not true of a bar and the products fabricated therefrom.

The higher rates on the bars actually produce a smaller aggregate charge for the transportation of the material that is transformed into bolts and nuts than do the lower rates on the rods. Of the bars used for making bolts and nuts only about 60,000 tons per annum come in the same sizes as rods.

Rods vs. Bars

The hexagonal and rectangular rods made on a rod mill and rods of all shapes made on a merchant or combination mill were formerly known by the carriers and certain of the large producers as bars and the manufactured iron and steel rates were applied thereon. In our prior decisions we found they were in fact rods and should take the billet rates. As transported by the carriers they do not differ materially from the round rods made on a rod mill either in appearance or as to content of imperfect material.

Nevertheless is appears that the carriers have never been reconciled to the prior decisions and in many instances are continuing to apply the manufactured iron and steel rates particularly on the hexagonal and rectangular rods in coils. In order to avoid controversy in the future protestants, which include 135 manufacturers and users, propose the following tariff description in lieu of that above quoted:

(*Please turn to page 97*)

Electrification in Wire Drawing Plants

An up-to-date tabulation of installations and extensions includes all main roll drive equipped plants in the United States and Canada

THE information tabulated below is compiled as of December 31st, 1928. and for the first time has been made available for convenient reference in this form by "Iron and Steel Engineer", official transactions of the Association of Iron and Steel Electrical Engineers.

Through the courtesy of the Association we are reprinting the data having to do with wire mills. The complete compilation from which the selections were made includes sheet, plate, bar, strip, hoop and other mills to the number of several hundred.

In the past this information has been published in catalogue form by the different electrical equipment manufacturing companies, each catalogue including only those installations involving their own equipment. It has always been difficult to properly analyze the information included in these various publications because of the wide difference in the method of tabulation used by the various manufacturers.

In the tabulation below, the information is presented in a uniform manner showing the Horse Power, R. P. M., Voltage, Cycles, Type and Size of Mill, Method of Drive, Date of Purchase, Name of Plant and Location. The data has been prepared with a view to providing an authoritative reference for guidance in future installations and extensions.

WIRE MILLS

Horse Power	R. P. M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
300	450	440	60	Wire Mill		1914	American Steel & Wire Co.	Joliet, Ill.	AC
300	450	440	60	Wire Mill	Geared	1914	American Steel & Wire Co.	Joliet, Ill.	AC
300	600	2300	60	Wire Mill	Geared	1917	American Steel & Wire Co.	Waukegan, Ill.	GE
325	600	2300	60	Wire Mill	Geared	1917	American Steel & Wire Co.	Waukegan, Ill.	GE
350	300	230	d. c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
350	300	230	d. c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
350	300	230	d. c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
350	300	230	d. c.	Wire Draw Bench	Coupled	1911	Pittsburgh Steel Co.	Monessen, Pa.	CW
400	600	2200	60	Wire Rod Mill	Geared	1917	Rome Wire Co.	Rome, N. Y.	AC
400	600	440	60	Wire Rod Mill	Coupled	1917	Rome Wire Co.	Rome, N. Y.	AC
450	720	2200	60	Wire Bench Mill	Geared	1928	Gulf States Steel Co.	Alabama City, Ala.	W
450	720	2200	60	Wire Bench Mill	Geared	1928	Gulf States Steel Co.	Alabama City, Ala.	W
450	720	2200	60	Wire Bench Mill	Geared	1928	Gulf States Steel Co.	Alabama City, Ala.	W
500	450	440	60	Wire Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
750	514	2200	60	Wire Rod Mill	Geared	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
800	450	2200	60	Wire Rod Mill	Coupled	1919	Black Steel & Wire Co.	Kansas City, Mo.	AC
900	163	2200	60	Wire Rod Mill	Coupled	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
900	163	2200	60	Wire Rod Mill	Rope	1919	Black Steel & Wire Co.	Kansas City, Mo.	AC
1200	514	2200	60	Wire Rod Mill	Geared	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
1300	360	2200	60	Wire Rod Mill	Coupled	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
1500	514	2200	60	Wire Rod Mill	Coupled	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC

BRASS, COPPER AND NON-FERROUS MILL DRIVES

Horse Power	R. P. M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
500	440	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
350	400	2200	60	Wire Rod Mill	Geared	1918	Taunton N. Bedf'd Copper Co.	New Bedford,Mass.	AC
350	400	2200	60	Wire Rod Mill	Coupled	1918	Taunton N. Bedf'd Copper Co.	New Bedford,Mass.	AC
350	400	2200	60	Wire Rod Mill	Coupled	1918	Taunton N. Bedf'd Copper Co.	New Bedford,Mass.	AC
400	277	2200	60	Copper Rod Mill	Direct	1927	Washburn Wire Co.	Philipsdale, R. I.	AC
400	352	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
400	400	2200	60	Copper Rod Mill	Direct	1927	Washburn Wire Co.	Phillipsdale, R. I.	AC
400	440	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
400	720	2200	60	Copper Mill	Geared	1920	Rome Wire Co.	Rome, N. Y.	GE
500	440	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
500	575	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
500	600	2200	60	Copper Rod Mill	Geared	1922	E. F. Phillips Elec. Wks.	Montreal, Que.	W
600	300	550	60	Copper Rod Mill	Direct	1926	American Brass Company	Ansonia, Conn.	GE
600	360	550	60	Copper Rod Mill	Direct	1926	American Brass Company	Ansonia, Conn.	GE
600	600	550	60	Copper Rod Mill	Geared	1925	Phillips Wire Company	Pawtucket, R. I.	GE
600	900	440	60	Copper Rod Mill	Geared	1920	Western Electric	Hawthorne, Ill.	GE
700	585	2200	60	Copper Rod Mill	Geared	1923	E. F. Phillips Elec. Wks.	Montreal, Que.	W
800	353	440	50	8" Copper Rod	Direct	1923	Stan. Underground Cable Co.	St. Louis, Mo.	W
800	870	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
800	870	3200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
800	900	440	60	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
900	900	440	60	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
1350	600	2300	60	Copper Mill	Geared	1918	American Brass Company	Waterbury, Conn.	GE

Mail plane showing use of steel external streamline wires.

Steel Wire in Modern Aircraft Construction

Growing industry's requirements have developed new types of streamline and internal tie wires, strand and cable

By John F. Hardecker

Chief Draftsman, United States Navy Yard Naval Aircraft Factory, Philadelphia

IT is just about twenty-five years since the Wright Brothers made the first flight in a heavier-than-air machine at Kitty Hawk, N. C. No industry has ever shown a more remarkable quarter century history of progress than the aircraft industry in America, taking the recent Aircraft Show at the Chicago Coliseum as an index.

Despite occasional lay enthusiasm concerning the air lines of Europe, competent aeronautical observers, just returned from abroad, assure us that with the possible exception of large seaplanes and airdromes, the United States leads the world in aviation progress and development. Aviation in in America has already reached the proportions of a $100,000,000 industry and airplane transportation has within two years become a positive factor of industry and commerce.

During the year 1927 the total number of airplanes made in this country was less than 2,000, including those for the Army, Navy and Postal Departments, as well as those for commercial requirements. It has been estimated that for 1928 the production will reach 15,000 planes, an increase of 750 per cent. During the month of June, 1480 planes were cleared at the Cleveland Municipal Airport, which is the home field of nine private companies, and is crossed by six mail lines.

Steel Wire To the Fore

To this very considerable progress, the steel wire industry has been a major contributor. First in the form of aircraft wire, non-flexible, flexible and extra flexible cable, and then in the form of streamline wires and internal wires (both round and square) it has given its full measure of cooperative development. The very rigid requirements for high strength coupled with resistance to vibration and weather, with application in such critical locations that a single failure would bring disaster to pilot, plane and passenger alike, has been a challenge to the ingenuity of the steel wire manufacture, whose success in coping with the situation merits the highest approbation.

Perhaps the most significant products, and the ones having the greatest application in modern aircraft construction are the streamline wires and the internal tie wires (both round and square). These wires, terminating in threaded ends fitted with forked terminals, are attached to the airplanes by means of clevis pins and cotters.

The streamline wires provide the most ideal method of bracing an airplane externally, for they make possible maximum rigidity, strength and speed with minimum weight and vibration; hence, a ship equipped in such a manner yields more air miles per gallon of gas consumed. Streamline wires offer approximately one sixth the wind resistance of round wires of the same tensile strength

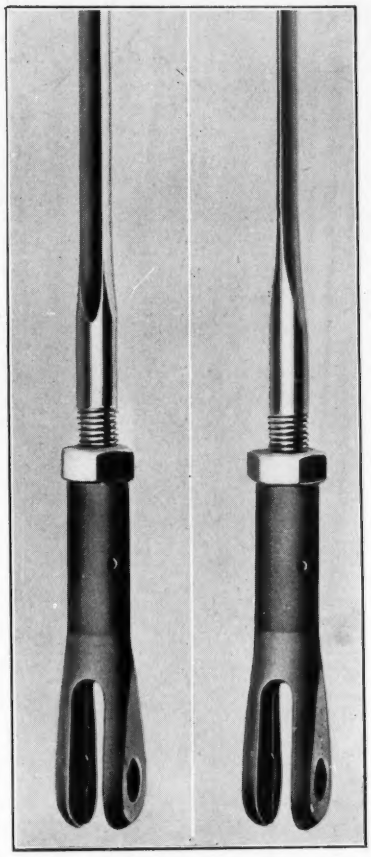
and approximately one-seventh that of wire cable. This may result in an increase of as much as 10% in the speed of a plane with an accompanying saving of 10% in the fuel consumption —a decidedly worthwhile saving.

For internal use, round and square tie wires present much the same advantages over full section wire and cable. Swaged wires were used at one time; but the abusive swaging process had too adverse an effect on the structure of the steel, and the swaged wire was consequently not sufficiently dependable. Pending the advent of the new internal tie rods, which are not swaged, streamline wires were used for a time. These new internal tie wires have a great advantage over streamline wire because they are less affected by the vibration and bending stresses, and because they can be adjusted to any position without danger of having sharp edges come in contact with one another. They are 48% lighter than wire without reduced center section. The round and square types are used interchangeably and are both lower in cost than the streamline wire.

Right and Left Hand Threads

Much time and labor are saved in equipping a plane with streamline or internal tie wires, the installation being greatly simplified by the right and left hand threads through which the anchorage is made. Cable anchorage is difficult at best, the human element often making unsafe cable that must be spliced and soldered. The stretch in wire cable is considerable, while that in these streamline and internal tie wires is negligible.

Originally wire strand and wire cables were used almost universally for tie purposes on aircraft, but they left much to be desired. The cables had to be equipped with turnbuckles to take care of the stretch that always accompanies stranded members; also with thimbles, splices, etc., all of which were heavy and offered much resistance to the air when exposed to it. The new wires, being threaded with right and left hand threads, do away with turnbuckles, being virtually turnbuckles in themselves.



Left: Stewart-Hartshorne Square Tie Wire for internal use. Right: Steel streamline wire for external bracing. Both are threaded with right and left hand threads, making turnbuckles unnecessary.

Material

The steel used is either SAE 1045 or 1050, manufactured by the open-hearth, electric or crucible process, and must be homogeneous and free from excessive metallic inclusions. When received, the chemical analysis of the steel is checked against the steelmaker's report and a piece cut off of each and every coil for inspection for pipes, seams or other physical defects before it is processed. The steel is then heat treated by pulling it through a 60-foot furnace at 1000 degrees Centigrade. The steel is then pickled or cleaned as well as dried or baked before it is drawn.

Manufacture

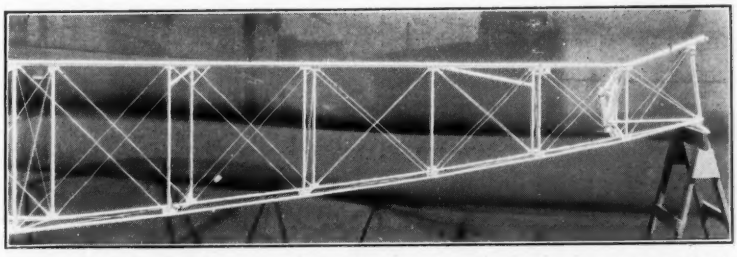
The wire is then drawn to the proper size for the manufacture of the various sized streamline, round and square drawn wires. It will be noted that all the cold work is put on the steel after heat-treating. This wire is then straightened and cut to the proper lengths of the wire required.

For streamline wires the section is attained by cold rolling —the straightened and cut wire being put between rolls and rolled to the proper size and shape. Each end, of course, is left round in order that these ends may be threaded.

The round drawn wires are drawn through split dies, thereby leaving the ends round for the threading. The wrench grips are pressed on, swaging or even hammering the steel being avoided in this particular.

The square wires, in that the entire portion of the reduced section is square, require no wrench grips; the wrench being applicable at any portion along the entire length, thus making them extremely accessible.

By the exactitude of the work, and the process itself of heat-treating, drawing and rolling, each and every finished tie wire from the same coil of steel wire is bound to be identical in every



Fuselage of Douglas plane showing use of internal round wires which are less affected by vibration and bending stresses than the structurally weakened swaged wire formerly used.

respect, so far as the structure of the steel, tensile strength and bend resisting ability are concerned. Several short test pieces are manufactured with each batch of streamline and tie wires from each coil to provide sample for tensile strength and bend tests. These are tested in regular standardized testing machines. All wires shall have an ultimate tensile strength for each given size as shown in Table I.

Table I

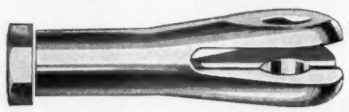
Size Threads	Ultimate Strength of Threaded Portion (Pounds)	Ultimate Strength of Central Portion (Pounds)
#6-40	1080	1000
10-32	2200	2100
¼"-28	4100	3400
5/16"-24	6600	6100
⅜"-24	10100	8000
7/16"-20	13700	11500
½"-20	18600	15500
*9/16"-18		20200
*⅝"-18		24700
*11/16"-16		30000
*¾"-16		35000

*Streamline Wires only in these sizes.

Terminals

A universal strap terminal

Safe Lock Type Terminal (MacWhyte). The nut can be screwed to destruction without injury to the wire threads.



Prevailing type of Rigid Terminal. Tests 125,000 pounds per square inch tensile strength. Locks with hexagon nut.

was used to a great extent at one time; but the prevailing type of terminal is a machined terminal made of SAE 2330 steel, heat treated to 125,000 pounds per square inch tensile strength. Threads in the terminal and on the wire are made to conform to the tolerance of the National Screw Thread Commission's Class III Medium Fit. The terminal is locked in place after adjustment by a regular hexagon nut.

An interesting variation of the terminal finding increasing usage is the Safe Lock Type, which eliminates the danger on the standard type of screwing the lock nut too tightly against the terminal, thus setting up undue torsional and tensile strains in the wire. This terminal is so designed that the nut can be screwed to destruction without injury to the wire threads. The compressive locking of the terminal on the wire also insures the closest kind of a thread fit and no moisture can find its way in to the detriment of the threads. At the same time, the maximum strength of the threads is maintained.

Finish

Cadium plating is gradually superseding zinc plating for finish, being more effective than zinc in resisting corrosion and at the same time is approximately 1/10 the weight of zinc. The plating is applied after the threads have been cut, thus insuring an effective and approved protection for both the rod and the terminals.

Use

These wires are used for the following general purposes on airplanes:

Streamline Wires

Exterior wiring for wings such as flying wires, landing wires, forward and aft stagger wires and engine mounting brace wires.

Exterior brace wiring for fixed tail surfaces (fin and stabilizer.)

Exterior brace wiring for control surface (rudder, elevator and aileron.)

Exterior brace wiring for float and landing gear erections.

Round or Square Tie Wires

Drag wires for interior of wings, ailerons and tail surfaces.

Brace wires for fuselages, hulls and floats.

Aircraft Wire, Strand and Cable

While to a considerable extent superseded by streamline and internal tie wires for quantity production of planes, it still has a considerable usage in the development of new models of planes, as well as in some smaller commercial planes. It is fabricated with a wire loop with ferrules, turnbuckles and shack-

(*Please turn to page 102*)

Table II. Sizes, Weights and Physical Properties

Diameter Inch	Wgt. per 100 ft. (approx.) Pounds	Torsion Test No. of turns (minimum)	Bend Test No. bends Minimum	Breaking strength (minimum) Pounds	Tensils strength per sq. in. (minimum) Pounds
.306	24.87	2	2	14,000	190,000
.283	21.14	4	2	12,100	192,000
.262	18.25	5	2	10,520	195,000
.244	15.71	5	2	9,200	197,000
.225	13.36	6	3	7,950	200,000
.207	11.31	8	3	6,850	204,000
.192	9.73	9	4	6,030	208,000
.177	8.27	9	4	5,250	213,000
.162	6.93	11	5	4,520	219,000
.148	5.78	12	6	3,850	224,000
.135	4.80	15	7	3,290	230,000
.120	3.80	17	9	2,670	236,000
.105	2.91	21	11	2,090	241,000
.091	2.23	25	14	1,600	248,000
.080	1.69	29	17	1,250	252,000
.072	1.37	33	21	1,040	255,000
.062	1.05	38	25	775	258,000
.054	.770	46	21	600	263,000
.047	.583	53	29	460	268,000
.041	.444	63	50	356	270,000
.034	.333	74	78	250	275,000
.032	.270	84	85	225	280,000

(b) The variation above specified diameter on all sizes shall not exceed .002 inch. The variation below specified diameter on all sizes shall not exceed .0005 inch.

Silver Solders Find New Uses In Wire Industries

Free flowing standardized compositions provide low melting point, strong ductile joints, high conductivity and resistance to vibration and corrosion

By R. R. Shuman

SOLDERS containing silver are no longer confined to their use in the manufacture of silverware and jewelry, industries in which they have been used for many years. Of late there has been more general recognition of desirable qualities of silver solders that make them suitable for a variety of metal manufacturing processes in other industries.

Research by leading fabricators of precious metals has led to perfection and standardization of compositions having accurately determined percentages of silver, so there is now a silver solder available to meet almost any condition.

General Characteristics

Following are some brief comments on the characteristics of silver solders as a group:

They bridge the melting temperature gap between the lead-and-tin solders and the spelter or brass solders. Melting points range from 1325° to 1600° F. Soft solders are easy to use but are not strong. Base metal hard solders are strong, but they must be used with such high temperatures that often the metal parts are melted or at least weakened. Silver solders have a sufficiently lower melting point to give a margin of safety and can be used practicably even on extruded brass or bronze.

Silver solders stand up under vibration, as is demonstrated by the fact that the United States Government requires their use in certain parts of airplane construction where the vibration is heavy. They are used on delicate vibrating parts of radio loud-speakers and in many other ways where vibration is a factor.

Silver solder joints are usually stronger than the parts themselves, the tensile strength usually ranging from 40,000 to 60,000 pounds per square inch.

Silver solders are so free-flowing that the solder penetrates quickly and deeply into all parts of the joint, making a solid bond that is free from pits or pin holes. Therefore they are used wherever a joint is required that will be leak-tight, either for gas or liquid.

Silver has a higher electrical conductivity than copper, brass, steel, or other metals used in electrical construction. Either pure or usually in combination with copper and other alloys, it makes a solder that is finding increased acceptance in electrical crafts.

In addition to its conductivity silver solder is described as having a large factor of resistance to vibration and corrosion. It flows more freely than ordinary hard solders and so little of it is required that it makes neat, compact joints.

Many Electrical Uses

Among its uses in the electrical crafts are these:—

Welding commutator segments.

Soldering leads or other joints subject to rise in temperature above the critical point of soft solder.

Joining bus bars, contractors, etc.

Brazing rotor bars and end connectors on polyphase induction motors.

Sealing radio or x-ray bulbs.

Joining lengths of copper wire for trolley or overhead light and power lines as well as underground cables —telephone wires and cables; in fact, for all copper wire used electrically.

For neat, compact joints only a film of silver solder is needed. It is therefore desirable for joints on brass and bronze fixtures where the joint must match in color and be inconspicuous. For the same reason silver solder is widely used for joining the ends of band saws.

As silver solders flow at relatively low temperatures and flow freely, they are quick and easy to use. Important saving in unit cost on quantity production schedules has been noted by silver brazers.

Some Specific Advantages

Silver solders make strong sound joints on any metals having melting points higher than 1400°F. They are particularly suitable for copper, brass, bronze, monel, nickel, and various alloys of steel, including stainless steel.

In welding rods or heavy wire, the ends are beveled, and, the bevels are held tightly together in a vise and subjected to a brazing heat, either from an electric arc or an oxy-acetylene or air-gas torch. In some cases a clipping from a thin sheet of silver solder is inserted between the two beveled faces, and in others molten solder is applied from a strip or wire held in the torch flame.

An interesting operation is that of joining lengths of "copperweld" wire, a wire with a steel centre and copper envelope. While the two metals are practically homogeneous their coefficients of expansion differ materially. Another complication is the fact that the

(*Please turn to page 99*)

A New Method of Diamond Die Cutting

Wire drill, which replaces needle-and-dust process, turns out more accurate sizes in one-tenth the time formerly required.

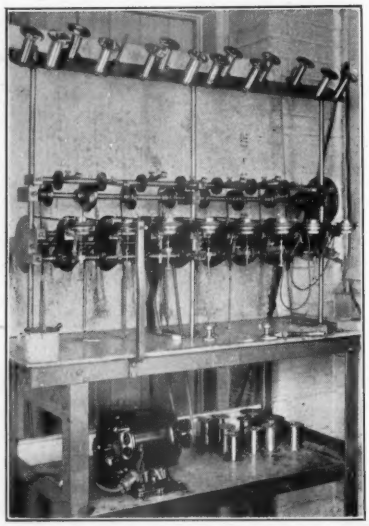
By Morris A. Hall

DIAMOND die men have always admitted that there were marked limitations to the needle-and-diamond-dust method in universal use for cutting and recutting diamond dies, yet that method continues. As Mark Twain remarked about the weather, "Everybody talks about it but no one ever does anything." It has long been admitted that the ideal method would include some way of cutting with wire the holes used to produce wire, yet up to now no practical method has been evolved which would cut or recut wire dies with a wire.

Now such a method has been worked out, a machine has been produced, and the writer can testify of his contact with it and the work produced that it works well and moreover is many times faster than the needle-and-dust method. The present machine and perfected method have been in continuous work-a-day use in a busy plant for more than two years. In that time with a single small machine, to be illustrated and described, not alone have five or six die cutters been replaced by one, but he has been doing all the setting and all other work of handling a large quantity of dies in a wide range of sizes, which setting and other work was not previously done in that plant.

New Method Cuts Faster

This would suggest that the machine and method turn out about ten times as much work as ordinary and that is correct. Moreover, within the actual die recutting more thousandths of an inch of diamond surface are removed than by the needle-and-dust method in just that proportion (ten times). Further, in emergencies dies can be recut even faster up to 15 times needle speed and recut to greater accuracy. With this machine and method it has been possible to round up worn dies without enlarging the size of the largest part, as for instance, a die that measures .0071—.0074 inches out of round by .0003 (three ten-thousandths), can be recut to be .0074 all over.



In each of the eight units there is a jigsaw motion of upper and lower carrying arms above and below a rotating die holder. Adjustable cams vary the length of stroke. The pulley shaft is driven by a ¼ h. p. motor

In the above reference is had to the machine that has been worked out and constructed by William Haddow, master mechanic for the Hudson Wire Co., Ossining, N. Y. The firm produces a wide range of bare fine wires, brush wire, two-metal wires, lahn, etc., in copper, brass, zinc, lead, nickel silver, prosphor and other bronze, steel and other metals. Mr. Haddow has worked on this problem for many years but approximately twelve years ago satisfied himself that proper die recutting should be done by means of a continuous wire passing through the hole rather than an external tool entering and leaving on each strike.

The more experience he had with his firm's recutting work using the needle method the more certain he became that the wire was the natural logical and correct unit around which to build a die-recutting machine. This is not to say that he did not build many needle machines, for he did. The company's present battery of 39 such, now idle, gives evidence of his skill along these lines. These take up approximately 500 sq. ft. of floor space in the plant while the machine that has replaced them occupies less than one-tenth that. They kept four to six skilled operators busy, the number varying with the work and seasons. Now one young man does all that and more.

Evolved From Experiments

Formerly all setting was done outside, the cutters simply recut to larger sizes dies as bought outside already set or shop dies as they became worn. Now all setting is done in the shop and by this same man. Formerly the firms furnishing the dies were willing to furnish these in any desired size, now they prefer to furnish unset diamonds with a hole of minimum size because the Haddow machine will recut these to working sizes faster, more accurately and cheaper than they could.

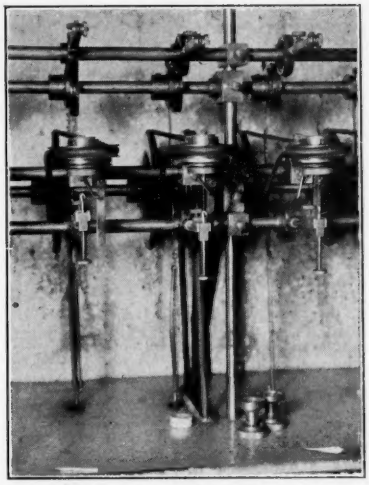
Like other inventions Mr. Haddow's "child" has passed through many and various

stages of evolution. Three or four years ago he evolved an up-and-down motion with wire passing through the die held in a horizontal position that satisfied him of two things, both of which he then and still considers fundamental. One was that the die be held in the horizontal position and the other that the wire move vertically. When rotation of the die and various adjustments for position of wire and die were added, the present machine was born.

This was completed and put into service more than two years ago, although it was intended to be an experimental machine and for that reason was built of cold rolled steel stock in such shapes and sizes as were available so it could be turned out quickly and cheaply, yet modified readily. It was so well conceived and executed that in the ensuing years of continuous daily work no change has been necessary.

How It Works

It might be described in the fewest words as a series of eight units, each consisting of a jig-saw or up-and-down motion of upper and lower carrying arms, these being positioned above and below a rotating die holder. The up-and-down motion is imparted by cams which actuate the middle of ball-bearing arms. The cams are adjustable to vary the length of stroke. The upper arm carries a simple flat-faced wire clamp, the lower arm a pivoted and adjustable member not unlike a button hook. The wire to be used is hooked over this, looped or twisted to hold it, then



To recut a die it is gauged for size, put in the collet, wire of the correct diameter threaded through it, and the belt put on to start the die rotating and arms reciprocating. Then diamond dust does the cutting.

drawn taut and clamped in the upper arm.

The rotating unit is a drawn in collet of usual die size with a driving pulley on the extreme outside. This is driven by a small round leather belt from a pulley at the rear on the pulley shaft, the latter driven similarly from a ¼-horsepower motor below. As constructed the machine is equipped with enough interchangeable collets to take all regular sizes of die blanks.

The Recutting Process

To recut a die it is gauged for size, put in the collet, wire of the correct diameter threaded through it and fixed in place as described, the belt put on to start the die rotating and the arms reciprocating, and diamond dust added to do the actual cutting. In this, of course, the customary sizes of dust are used in the usual way, the difference up to this point being that the wire is always within the hole and its motion through the hole continuous so that it is cutting all the time, whereas with needles the cutting is done largely if not wholly on the forward stroke.

Uses Finer Diamond Dust

It was stated that the customary sizes of dust are used in the customary way, yet that is not precisely correct. The machine cuts so fast, so much faster than the needle method that it has been found advisable to use smaller sizes of dust more freely and larger sizes only when hogging out a large amount. In ordinary work in which the changes are by a few ten-thousandths and seldom exceed a thousandth, nine-tenths of the work is done with No. 5 and No. 6 Moreover, with the passing of considerable time in which all dies turned out were round and true the habit of accuracy which this method and machine have permitted has resulted in a tendency to use the finer No. 6 more and more.

No wax is used, thus saving the time of centering the die and of cleaning the wax off the finished die, and the recovered dust has no wax in it. This method has reduced the amount of diamond dust used per thousandth cut about 25% over the needle method.

The dies are held by the outside of the blank in the collets and it makes no difference in the result if the hole is not con-

(*Please turn to page 100*)

FOUR DAYS SHOP PRODUCTION RECORDS

Oct. 1		Oct. 2		Oct. 3		Oct. 4	
Dies	Sizes	Dies	Sizes	Dies	Sizes	Dies	Sizes
54	.0055 —.0063	8	.0032 —.0035	5	.004 —.0045	2	.0056—.007
9	.0055 —.0065	2	.0035 —.004	1	.0036—.0045	3	.0055—.0065
2	.0055 —.007	9	.00275—.003	5	.0048—.0055	3	.005 —.0055
2	.00275—.003	3	.0025 —.00275	3	.0045—0055	18	.0055—.0063
		1	.0025 —.003	4	.005 —.0055	1	.0055—.007
67		2	.0029 —.0032	33	.0045—.005	27	
		25		4	.0055—.0065		
				17	.0055—.0063		
		8 hrs. cutting		72			
9½ hrs. cutting		1½ hrs. cleaning and marking		9½ hrs.		2½ hrs. cutting	
88.5/1,000 cut		25/1,000 cut		85/1,000 cut		33/1,000 cut	

NEWS *of the* INDUSTRY

Foreign Trade Opportunities

FOREIGN trade opportunities reported by the U. S. Bureau of Foreign and Domestic Commerce during the month of February include inquiries from the following sources: For wiring supplies and lighting fixtures (36011) from Johannesburg, South Africa; for bolts and nuts (36047) from Buenos Ayres, Argentina; for barbed wire (35998) from Pernambuco, Brazil; for underground telephone cables (36293) from Belgrade, Yugoslavia; for wiring supplies and fixtures (36302) from Quebec, Canada; for cut nail machines (36306) from Maastricht, Netherlands; for insulated enameled wire for radios (36370) from Paris, France; for carload lots of galvanized steel barbed fencing wire (36463) from Piedras Negras, Mexico; for car seals (36424) from Medan, Sumatra. for wiring supplies, fixtures, and appliances (36618) from Cochabamba, Bolivia; for wire netting and fence wire (36587) from Manila, P. I.

A revised mimeographed trade list of importers and dealers of electrical apparatus and supplies in Japan has recently been compiled by the Commercial Intelligence Division of the Bureau of Foreign and Domestic Commerce. Copies may be obtained from the Washington headquarters of the Bureau or from any of its district or cooperative offices by referring to the title and file number (FE-11681-A).

TENDERS have been requested for equipment in connection with the erection of a ball and roller-bearing factory at Barcelona, Spain. The bids should cover all machinery (other than power units) tools, and accessories necessary for such a plant. The plant is to have a daily capacity of 250 sets of ball bearings and 50 sets of roller bearings.

It is preferred that an engineer or expert should accompany the machinery and put the establishment in running order. Full technical descriptions should accompany the bids. Interested American firms may secure further details directly from Mr. Alfred N. Schutte, Calle Lauria 18, Barcelonia, Spain.

BARBED wire ("ronces metalliques") is now exempt from the octroi sea tax in French Oceania according to a decree dated December 20, 1928. Formerly the commodity was subject to an ad valorem tax of 12 per cent. based on the official price lists, or, in default of the latter, according to the f. o. b. invoice price increased by 25 per cent.

Westinghouse Gets Order

THE Westinghouse International Co. has recently received an order through the Electric Supplies Co. of Spain for equipment to be used in lighting the World's Fair, which will be held at Barcelona this year. The order amounts to approximately $250,000 and includes a preset switchboard which is the largest that has ever been built. This is the first time that mobile lighting will be used at an exposition of this kind. The total amount of power to be controlled is about 5,000 k. w.

Exports of iron and steel wire products from the United States
(In gross tons)

				January, through December	
				1928	1927
Plain wire	3,522	4,356	2,891	46,160	35,435
Barbed wire and woven wire fencing	5,371	7,476	4,128	74,341	52,393
Wire cloth and screening	203	173	167	1,881	2,255
Wire rope	610	461	398	5,365	4,547
Insulated wire and cable	45	104	21	642	491
Other wire and manufactures of	700	930	855	10,469	9,558
Wire nails	1,007	844	1,369	14,547	9,990
Nails, other than wire	804	762	800	9,156	7,534
Tacks	75	56	74	743	895
Horseshoes	48	45	54	468	563
Bolts, nuts, rivets, except track	857	1,588	1,196	13,278	12,228

Imports of iron and steel wire products into the United States
(In gross tons)

				January, through December	
				1928	1927
Barbed wire	831	1,111	261	5,635	4,027
Round iron and steel wire	443	423	296	4,692	3,963
Steel telegraph and telephone wire	.....	.....	3	183	35
Flat wire and strip steel	256	305	144	2,518	2,543
Wire rope and strand	157	147	150	1,676	2,178
Other wire	90	183	17	774	1,145
Nails, tacks, and staples	799	1,126	224	10,136	5,665
Bolts, nuts, rivets, and washers	51	5	26	278	356

Radio Enlarges Plant

PRODUCTION of vacuum tubes for the Radio Corp. of America in 1929 will exceed the 1928 output—a record-breaking year—by 150%, J. L. Ray, vice president in charge of sales, has announced. To handle this increased production, factory facilities at Bloomfield, N. J., Newark, N. J., and Cleveland, O., are being enlarged and reorganized. Plant additions will bring the total floor space employed in tube production alone to 18.6 acres when the maximum schedule is reached.

Research on Mechanical Springs

WITH the widespread support of industry during the first year of actual research, the American Society of Mechanical Engineers Special Research Committee on Mechanical Springs attained several definite objectives. During 1928 the laboratory facilities of Union College, Schenectady, were used

for a start on the committee's program under the direction of Prof. M. F. Sayre, and the committee's research associate, Anthony Hoadley. Prompted by suggestions received from many manufacturers, the committee decided to undertake a study of the fatigue and the fatigue-corrosion properties of spring materials, and in this connection has been extremely fortunate in obtaining the facilities of the U. S. Naval Experimental Station at Annapolis, Md., and the able services of Dr. D. J. McAdam, Jr., who is at present supervising the experimental work. Experiments are also being conducted for the committee at Lehigh University, Bethlehem, Pa.

Obituary

Benjamin L. Sommer, chairman of the board of the Keystone Steel & Wire Co., Peoria, Ill., and president of the Mid-States Steel & Wire Co., Crawfordsville, Indiana, died February 8th, aged 49 years. He was the son of Peter Sommer, founder of the Keystone Company. Prior to his election as chairman in April, 1928, he has served as president for many years. A brother, William H. Sommer, is now president of the company.

F. L. Mueller, vice president of the Advance Spring & Wire Company, Chicago, died February 1st as the result of an automobile accident. He was 29 years of age and the son of F. C. Mueller, president of the company.

Raphael Eccleston Gallaher, president of the New York Insulated Wire Company, New York and Wallingford, Conn., died at his home in New York City on February 10th, aged seventy-eight years He was a native of Richmond, Va., and a pioneer in the wire and cable industry. He organized the New York company in 1884 and served as its secretary until he was made president in 1927.

Building and Expansion

The Salem, Ohio, plant of the American Steel & Wire Co. closes permanently on March 1st and the machinery is being shipped to other of the company's mills. About 200 employees are affected. Excessive freight rates on raw material and high operating costs are given as the reason for the shut-down. Wire nails have been the sole product of the plant for the past year.

American Brush Wire Co., a new organization, has taken over part of the Plastic Molding Co. factory in Sandy Hook, N. J. The new venture is backed by John McCarthy of the Newtown Coal and Grain Co. Martin McNamara is the superintendent in charge.

Wagner Electric Co., Plymouth Avenue, St. Louis, Mo., manufacturers of motors and parts, will build a five-story plant addition at an estimated cost of $200,000 with equipment.

Illinois Electric Co., 314 W. Madison St., Chicago, manufacturers of electrical supplies and equipment, wil build and equip a new four-story unit at an estimated cost of $400,000.

Marine Wire Co., Muskegon, Michigan, has awarded contract for a two-story plant addition to be built and equipped at a cost of about $40,000.

Atlas Fence Co., Verona Avenue, Newark, N. J., will build and equip a one-story addition at an estimated cost of $25,000.

Arrow Electric Co., Hawthorne Street, Hartford, Conn., manufacturers of electric switches and supplies, will build a two-story plant addition at an estimated cost of $100,000.

Wright & Corson Co., Milford, Conn., manufacturers of rivets, studs, etc., will build additional plant units this summer at a cost estimated to be more than $400,000.

Flint Ornamental Iron & Wire Works, Flint, Michigan, will build an addition to present plant at an estimated cost of $40,000.

The Standard Radio Manufacturing Corporations Ltd., H. F. Moore, general manager, 90 Chestnut Street, Toronto, Ont., will build a new 2-story building to cost about $225,000.

The Anaconda Wire & Cable Co. has been organized by the Anaconda Copper Mining Co. to take over and operate wire and rod mills of parent company at Great Falls, Mont., and similar mills of the American Brass Co., at Kenosha, Wis. The new company will also purchase the plant and business of the Inland Wire & Cable Co., Sycamore, Ill.

COMING EVENTS

March 4-7. National Railway Appliance Exhibition at Chicago. Secretary, C. W. Kelly, 1014 S. Michigan Ave., Chicago.

March 13-14. Annual general meeting of the Institute of Metals. Hall of the Institution of Mechanical Engineers, Storey's Gate, S. W. 1, London, England.

Mch. 14. Annual meeting, Electric Hoist Mfrs. Ass'n., Hotel McAlpin, New York. E. Donald Tolles, Secretary, 165 Broadway.

April 6-14. All-American Aircraft Show, Detroit, Mich. Convention Hall, Board of Commerce.

April 8-12. American Foundrymen's Assn. at Chicago. Secretary, C. E. Hoyt, 222 W. Adams St., Chicago.

April 15-17. American Zinc Institute at St. Louis. Secretary, S. S. Tuthill, 27 Cedar St., New York.

May 6-11. Chemical Show. Grand Central Palace, New York City. International Exposition Company; F. W. Payne, President.

May 7. International Exposition. Seville, Spain. Hon. Thomas E. Campbell, U. S. Commissioner.

June 3-6. National Assn. of Purchasing Agents at Buffalo. Secretary, George A. Renard, 11 Park Place, New York.

June 5-7. Canadian Electric Railway Assn. at Montreal. Secretary, E. Smith, Jr., 35 Yonge St., Toronto.

June 24-28. Annual meeting, American Society for Testing Materials, Chalfonte Haddon Hall Hotel, Atlantic City, N. J. C. L. Warwick, Secretary, 1315 Spruce St., Philadelphia.

July 1-4. Summer meeting, American Society of Mechanical Engineers at Salt Lake City, Utah. Calvin W. Rice, Secretary, 29 W. 39th St., New York City.

July 8-11. Annual Convention, American Electro Platers' Society, at Detroit, Mich.

Sleeper & Hartley TRADE MARK

Practical Continuous Wire

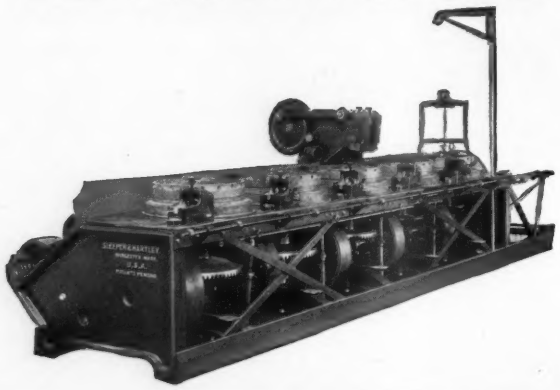
These Machines Go Into Production at ...

Rod Frame

(No. 5—14 or 15 wire)

Patented June 3, 1924—May 12, 1925—others pending

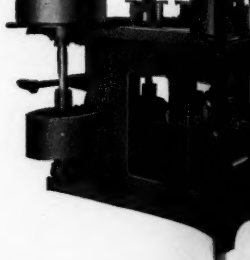
All Ball or Roller Bearings
No Differential Gearing.
Automatic Compensation for Speeds of Heads.



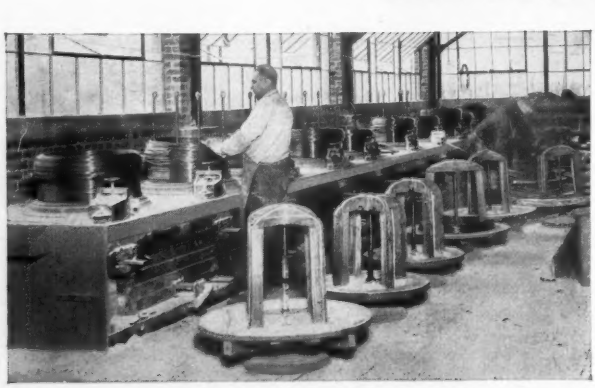
Double 5-Draft...

No. 14 to No. 23, ... or ...
3 to 4 Blocks ...erag...
No. 14 to 19—4 ... 400
No. 14 to 20—5 ... 100

More than 270 heads of ...prov...

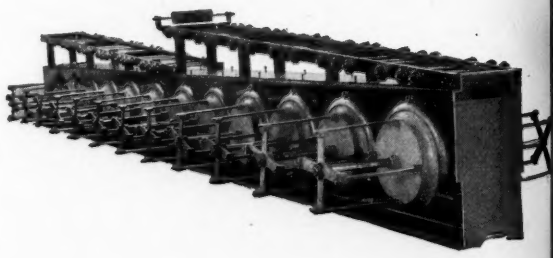


IMPROVED WIRE MILL EQUIP...



Standard Rod Frame—10 Block

Long, Stiff Spindles, in anti-friction bearings, and equipped with friction Clutches. Powerful and reliable.
Practically noiseless in operation.
(New Plant of Thompson Wire Co., Worcester, Mass.)



Patenting Furnace Take-Up

(New Plant of Thompson Wire Co., Worcester, Mass.)

AGENTS: CHICAGO TERRITORY
Neff, Kohlbusch & Bissell, Inc.

SAN FRANCISCO AND LOS ANGELES
Louis G. Henes

SLEEPER & ...

FOREIGN AGENTS AND REPRESENTATIVES: UNITED KINGDOM—Mr. Fredk. A. Perry, 63 Queen Victoria St., London, E. C. 4. FRANCE—Mr. Edgar Bloxham, 12 Rue du Delta, Paris. BELGIUM—Isbecque, Todd & Cie., 25-27 Boul. Emile Bockstael, Brussels. MONTREAL AND TORONTO—Arthur Jackson Machine Tool Co.

WORCESTE...

Wire Drawing Machinery

Sleeper & Hartley TRADE MARK

—Reducing Overhead-Increasing Production!!

Drafty, Intermediate

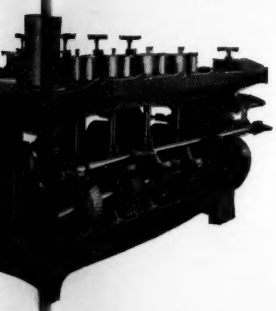
No. 23, ... or low carbon wire.

... locks to Average Operator.

9—4 ... 400 lbs. per block.

0—5 ... 100 lbs. per block.

...ads of ...proved model in operation

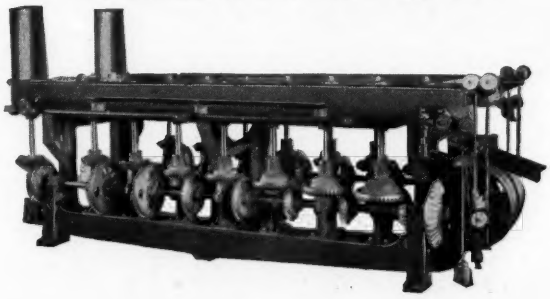


Double 8-Draft Fine Wire: Wet

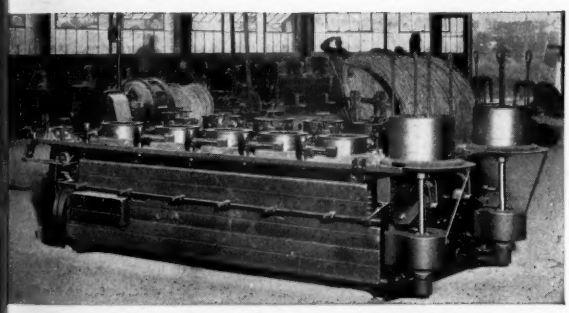
No. 22 to 36. High or low carbon wire.

6 Blocks to Average Operator, 22-33, 8-hole, 660 lbs. per day of ten hours.

Many thousands of these heads in operation



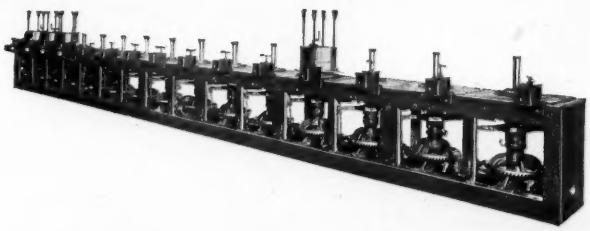
...UIPMENT RECENTLY INSTALLED



Double Six—Draft Dry Continuous For High Carbon Wire

Direct driven with silent chain. Cut gears throughout. Anti-friction bearings. Variable speed for finishing block.

(New Plant of Thompson Wire Co., Worcester, Mass.)



Heavy 16" Frame For .65 Carbon Wire No. 10½ to .037"

15 Blocks: Motor driven. Silent chain. Anti friction bearings and cut gears throughout.

(New Plant of Johnson Steel & Wire Co., Worcester, Mass.)

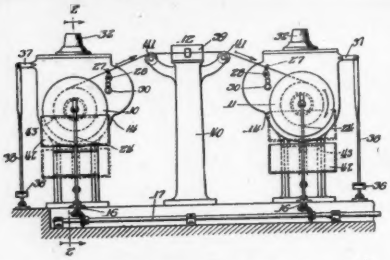
...& HARTLEY, Inc.

...TE... MASS., U. S. A.

Agents: Philadelphia Territory
Swind Machinery Co.

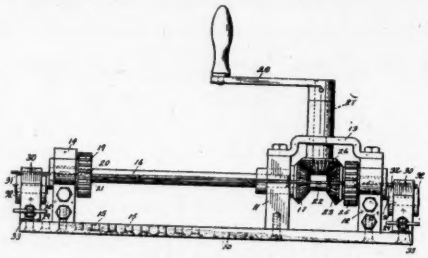
ITALY—Henry Coe & Clerici, Milan. AUSTRALIA AND NEW ZEALAND—Edwin Wood Pty., Ltd., Melbourne.
JAPAN—Andrews & George Co., Tokyo. SWEDEN AND FINLAND—Maskinaktiebolaget Karlebo, Stockholm.

A REVIEW OF RECENT PATENTS



Process and Machine for Drawing Wire 1,697,863

Complete descriptions and drawings of any of the patents referred to on this page may be had for twenty five cents. Address orders to Wire & Wire Products, 501 Fifth Avenue, New York City.



Wire Twisting Device 1,699,482

No. 1,697,863, PROCESS AND MACHINE FOR DRAWING WIRE. Patented January 8, 1929, by J. Birchard Green of Chicago, Ill. A wire drawing machine, comprising a die for reducing a wire passed therethrough, two rotatable bobbins positioned on opposite sides of the die for carrying the wire before and after it is passed through the die in either direction, means for causing the wire to wind helically in layers on either bobbin upon rotation of the same in one direction, two rotatable blocks also positioned on opposite sides of the die for drawing the wire into a removable coil on the last pass, and means for transmitting power to either bobbin or either block to effect rotation of either bobbin at low speed on the first pass and at high speed on the subsequent passes and rotation of either block at high speed on the last pass.

No. 1,699,482, WIRE TWISTING DEVICE. Patented January 15, 1929, by William C. Stevens of Akron, Ohio, Assignor to the Firestone Tire & Rubber Company of Akron, Ohio, a Corporation of Ohio. The general object of the invention is to provide a simple, speedy and effective device for twisting two wire ends together and locking them in place.

No. 1,697,890, WIRE-BINDING MACHINE. Patented January 8, 1929, by John L. Vaughn of Cicero, Illinois, Assignor to The Gerrard Company, Inc., of Chicago, Illinois, a Corporation of Delaware. More particularly, this invention has reference to a machine for stretching a bale tie of the usual type around a bale, box or other mass or container and for obtaining any desired tension thereon; for cutting the straight end portion of the wire at a predetermined length; and for twisting the straight end portion of the wire around the main body portion to obtain a strong and neat tie.

No. 1,698,050, CABLE FOR TRANSMITTING ELECTRICAL ENERGY. Patented January 8, 1929, by Lugi Emanueli of Milan, Italy, Assignor to the firm Pirelli & Co., of Milan, Italy. A cable construction providing a strengthening wrapping interposed between the body or core of the cable proper and the lead sheath which protects the exterior, the object being to prevent displacement of the conductors where the cable forms sharp bends.

No. 1,698,688, WIRE PULLING AND TWISTING TOOL and 1,698,689, WIRE TWISTING DEVICE. Both patents granted January 8, 1929, to Peter Beghetti of San Francisco, California. Both of these patents disclose tools for tightening and twisting wires as used by the builders of wooden concrete forms preparatory to pouring concrete into the forms.

No. 1,699,005, HOLDER FOR WIRE. Patented January 15, 1929, by George McLean of Los Angeles, California. A holder for electric welding wire or pencils, providing a simple resilient clamp to facilitate the operator's use of the device in small spaces or corners.

No. 1,699,174, WIRE ROPE. Patented January 15, 1929, by Herbert L. Whittemore of Washington, District of Columbia. A wire rope having a metallic helical core, which it is claimed will have a much greater compressive strength than a wire rope with a fiber core and which will deform sufficiently to permit the rope to pass over sheaves, drums or the like, without excessive stresses in the strand wires.

No. 1,700,069, CLOTHESPIN. Patented January 22, 1929, by Charles W. McKinney of Amarillo, Texas, Assignor of one-half to Thomas E. Johnson of Amarillo, Texas. An all wire clothespin having means whereby the same may be permanently held on a clothesline under normal circumstances and yet which may at the option of the user be readily and easily removed from the line.

No. 1,700,174, WIRE-CUTTING DEVICE. Patented January 29, 1929, by Howard O. McMillan of Minneapolis, Minnesota. A device designed particularly for cutting the wires used for tying together the forms used in concrete construction.

No. 1,700,170. METHOD OF MAKING ELASTIC METAL STRINGING. William A. Larned, Summit, N. J., Assignor to The Dayton Steel Racquet Company, Dayton, Ohio. The method of making an elastic metal stringing, which consists, first, in winding a number of wires around a core, then removing the latter and stretching said wires to a point beyond which they will torsionally react upon each other to give maintained elasticity under the action of a force.

No. 1,697,888, WIRE-DRAWING APPARATUS. Patented January 8, 1929, by Philip V. Tippet of Cuyahoga Falls, Ohio, Assignor to The Vaughn Machinery Company of Cuyahoga Falls, Ohio, a Corporation of Ohio. The object of this invention is to provide in a wire drawing drum or block an improved type of gripping mechanism which is automatically prevented from displacement, i. e., from flying out of the usual recess in the drum. Such improvements consist of the use of the ordinary drum having attached thereto a draw chain carrying at its outer end a wire gripper, and of means attached to the outer end of said chain which function upon rotation of the drum to pull the chain and gripper toward the drum.

No. 1,697,002, GAS SAVING APPLIANCE. Patented January 1, 1929, by John George Evanko of Pittsburgh, Pa. This invention relates to a device for increasing the combustibility of gas escaping from a burner, the general object of the invention being to provide a member formed of layers of wire mesh, the wires of which are covered with asbestos, the device being placed over the gas burner so that the flame must pass through the same.

No. 1,698,458. METHOD OF POLISHING WIRE-DRAWING DIES AND APPARATUS THEREFOR. Patented January 8, 1929, by Abraham Simons, New York, N. Y., assignor to Master Wire Die Corporation of New York. In a mechanism for polishing the wall of the bore of a wire drawing die, a polishing pin, a holder therefor, means adapted to reciprocate said holder in a direction having a component parallel to the axis of the said die, means adapted to exert a continuous lateral force on the said polishing pin, and means adapted to simultaneously turn the said die.

DIGEST OF RECENT TRADE LITERATURE

The Change in Tensile Strength Due to Ageing of Cold Drawn Iron and Steel. Bulletin, Iron and Steel Institute, London, England. 16 pages. Illustrated.

In the experimental work described in this paper by L. B. Pfeil, D. Sc., A. R. S. M., University College, Swansea, the tensile test was employed as a measure of the capacity of the metal to undergo age-hardening after cold-drawing, and it is shown that the phenomenon is chiefly due to the presence of carbon. Carbon-free iron is not subject to ageing, but iron containing as little as 0.0025 per cent. of carbon shows well-developed ageing. Iron containing ferrous oxide also exhibits the phenomenon. It is suggested that both carbon and iron oxide are soluble to a small degree in ferrite at ordinary temperatures, but that the solubility is less in distorted crystals, with the result that hardening and strengthening of the "duralumin" type occurs after cold-working.

Stresses in Heavy Closely Coiled Helical Springs. Paper presented at Annual Meeting, the American Society of Mechanical Engineers, New York, December, 1928.

A. M. Wahl of the Research Laboratory, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., contributes more exact formulas derived for computing stress in heavy closely coiled helical springs of the type used frequently in railroad work. These formulas indicate that the maximum stress in such springs may, in many practical cases, be from 40 to 60 per cent greater than the stress computed by the use of ordinary helical-spring formulas. The new formulas are verified by strain measurements, using special extensometers on semi-coils of actual springs loaded so as to simulate the actual loading of a complete spring, and on complete springs loaded in compression. The work indicates that the frequent failure of this type of spring in service may, at least in part, be due to the existence of higher stresses than thought possible on the basis of ordinary spring formulas.

Electrical Resistance and Magnetic Permeability of Iron Wire at Radio Frequencies. Physical Review, December, 1928. P. 967.

A report of experimental tests made by G. R. Wait, F. G. Brickwedde, and E. L. Hall checking and supplementing earlier investigations here and abroad. No critical change was observed in electrical resistance at high frequencies in tests that were carried out between 4300 and 2500 kilocycles (70 and 120 meters wave length), nor was any critical variation found in the permeability of iron wire at a frequency of 3000 kilocycles (100 meters wave length).

Trade Literature Received

Factory Lighting

"The Fenestra Way of Day Lighting and Airation." Detroit Steel Products Company, 2250 East Grand Boulevard, Detroit, Mich. A treatise explaining how the lighting and ventilating requirements of buildings may be analyzed in advance of construction. Outlines principles and methods by which provisions for natural lighting and ventilation can be predetermined as the result of a series of experiments and field surveys. Discusses controlled daylight in industrial plants, window areas and window heights, window washing, ventilation and illumination.

Labor Control

"The Manit System in Your Plant." Haynes Corporation, Industrial Engineers, First National Bank Building, Chicago. 56 pages. Illustrated with charts and graphs. Indexed. Describes a system for measuring and comparing the effiiency of labor operations in industry as a basis for new adjustments of pay and control. Reports experiences in cutting costs and increasing production in representative industrial plants.

Conveying Equipment

"Straight Line Trucking." The Stuebing Cowan Company, Cincinnati, Ohio. 16 pages. Illustrated. Description and specifications of a lifting and carrying unit comprising any number of skid platforms and one or more electric lift trucks. Trucks are made in six types, ranging in capacity from 2500 lbs. to 20,000 lbs. and are designed for economically lifting and hauling loads of varying weight and types of material.

Heat Treating

"Data on Industrial Heating Processes." The Surface Combustion Co., 2375 Dorr St., Toledo, Ohio. A very comprehensive data book, in loose leaf form, comprising several hundred pages of information about furnace, burner, and auxiliary equipment, combustion and engineering data. Illustrated with charts, diagrams and photographs of installations, including wire patenting and wire hardening furnaces supplied to well known manufacturers in the industry.

Rust Prevention

"Cadalyte, Its Development, Advantages and Operation." The Grasselli Chemical Company, Cleveland, Ohio. 32-page booklet describing the company's product and process for Cadmium plating and their advantages for rust protection of iron and steel. Includes data on properties of the metal, plating room technique, uses, tests and manufacturing costs.

AUTOMATIC
Wire Working Machinery
FOR SALE
SECOND HAND ONLY

Paper Clip Machines	Wire Nail Machines
Tack Machines	Spring Machines
Screw Pointers	Chain Machines
Screw Eye Machines	Rivet Machines
Shavers & Slotters	Cut Nail Machines
Riveting Machines	Draw Benches
Wire Pointers	Bull Blocks
Wire Rolling Mills	4 Slide Wire Machines
Headers of all kinds	Wire Cutters & Straightners
Bolt & Nut Machines	
Tapping Machines	Staple Making Machines
Cotter Pin Machines	

Roll Thread Machines

JESSE ATHERTON
24 CALENDER STREET
PROVIDENCE, R. I.

The Waterbury Wire Die Co.

Diamond and Chilled
IRON DIES
DIAMOND TOOLS
Waterbury, Conn.

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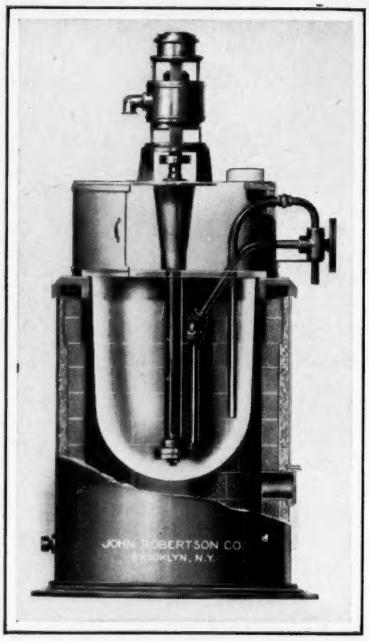
Gives counts and prices on over 8,000 different lines of business. No matter what your business, in this book you will find the number of your prospective customers listed.
Valuable information is also given as to how you can use the mails to secure orders and inquiries for your products or services.

Write for Your FREE Copy
R. L. POLK & CO., Detroit, Mich.
Largest City Directory Publishers in the World
Mailing List Compilers—Business Statistics
Producers of Direct Mail Advertising

New Lead Melting Pot With Pump



LARGE capacity lead encasing presses used by the electric cable and rubber hose industries require lead melting pots having a correspondingly large capacity with facilities for easily handling a great quantity of molten metal. For this purpose the lead melting pot shown in the illustration has been developed by John Robertson Co., Brooklyn, N. Y.

This melting pot, instead of being equipped with the ordinary valve seat and hand-operated valve mechanism, is equipped with a motor-driven centrifugal pump having a capacity for pumping 2000 to 2500 pounds of lead per minute. The pump is supported in a housing with special bearings and is connected by means of a flexible coupling with the vertical motor, which, in turn, is mounted on top of the hood. Both the furnace and hood are lined with insulating material and in addition to this the furnace is lined with circular fire-bricks, the base of the furnace being arranged so that any type of gas or oil-burner selected can be used.

The lead pump is designed to operate continuously so that the lead in the pot will be in continuous motion. The lead is drawn off to the extrusion press by means of a special stop valve mounted on the side of the hood. This pump in addition to delivering lead to the press serves as an agitator for antimonial lead and makes it possible to maintain more uniform temperature in the lead pot. The lead pot shown has a holding capacity of 20,000 pounds. Similar lead melting pots have been made with double valve equipment so that lead can be delivered to two presses at one time.

Welded Steel Vulcanizing Pan

FOR many years vulcanizing pans have been made of galvanized iron and have universally been of riveted construction with riveted iron hoops for stiffening. When these are subjected to heat, particularly steam, the condensation of moisture on cooling promotes rusting. Rivets loosen and the efficient life of the pan is shortened. The Mossberg Pressed Steel Corporation of Attleboro, Massachusetts, has adopted an alloyed steel that resists rust and is very little affected by corrosion due to material used in vulcanizing. These Mossberg pans are not riveted but are electrically welded, each pan being practically a homogeneous piece of steel. Older types of pans were provided with external lifting rings. This involved the attachment of at least three hooks and the service of more men or the use of more time when the pan was to be lifted. But so perfectly balanced are these Mossberg pans that they may be lifted by the one center

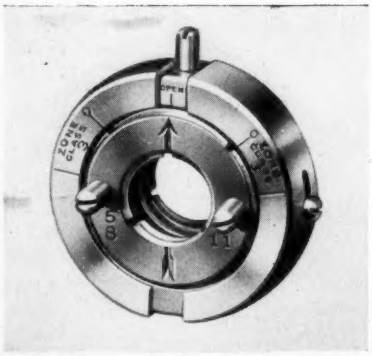
ring that is welded to cross members that brace the pan. These pans are made in any size, with or without covers.

The patented vulcanizing reel presents a number of improvements that have made it very popular with the wire industry. Resistant to corrosion and rust, it has an exceptionally long lift. Well-braced and electrically welded throughout, it will not spring or warp. Of open construction, it allows free and uniform circulation of heat. In the course of developing this vulcanizing equipment and the reels and spools required by wire manufacturers, much attention has been given to an engineering service. The Mossberg engineering department has worked hand in hand with manufacturers, and a great deal of confidential work has been done in perfecting equipment built from customer specifications. All designing and engineering problems come under the direct supervision of Mr. Frank Mossberg.

AN interlocking double hook that is simple and practicable has just been introduced by Public Works Equipment Co., Inc., 1776 Broadway, New York City. In operation the flared, reinforcing lips slip over the chain or cable and the hook locks itself. A half turn on the slack releases and the hook returns to closed position automatically—there is nothing to get out of order. The hook is always secure in any position and cannot accidently become unfastened. A "shoulder lock" feature prevents straining under heavy loads and the swivel is devised to give additional safety and convenience. There is nothing to foul on obstructions and it is claimed that the new hook, though smaller than ordinary hooks, is much stronger. The device is made in a variety of sizes for regular and special requirements.

New Safety Hook

New Screw Thread Gage



SCREW threads may be inspected economically by means of the Hartometer screw thread gage illustrated, which was invented by James Hartness, president of the Jones & Lamson Machine Co., Springfield, Vt., and is being placed on the market by that company.

(*Continued on page 96*)

HAVE YOU RECEIVED YOUR COPY OF

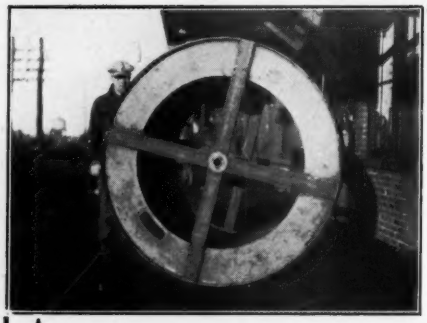
"Why Shipping Reels with Wooden Drums Go Bad?"

If not, ask for it.

Interesting facts and Pictures

R. B. Hayward Co.
1714 Sheffield Avenue
Chicago, U. S. A.

Manufacturers of
"RED HEAD"
SHIPPING REELS MACHINE
for the Wire & Cable Industry



An
Apco Mossberg
Big Boy all ready
to go to work

For every wire working or handling need there is an Apco Mossberg pressed steel reel, spool or bobbin ready to go to work.

They are light and durable, accepted throughout the wire industry as real cost savers. For vulcanizing, stranding, annealing or stripping get your reels from Apco Mossberg, headquarters for pressed steel equipment since Spanish War days.

APCO MOSSBERG CORPORATION

ATTLEBORO, MASS.

Specialists in pressed steel equipment for wire workers.

PATENTS
TRADE-MARKS
SERVICE

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LANCASTER & ALLWINE,
473 OURAY BUILDING
WASHINGTON, D. C.
Originators of forms, "Evidence of Conception."

(*Continued from page 95*)

The device is offered as an operator's gage for use at the machine, and also for general thread inspection. It warns the operator before the tolerance limit is reached and provides a tolerance zone by which the fit of the screw may be determined. It shows at once the errors of lead and diameter. The gage is made regularly in sizes from ⅜ to ¾ in. National Commission Standard fine and coarse series.

In use, the screw to be tested is turned into the gage until a few turns of the thread project from its face. The inner nut is then turned first in one direction and then in the other until it comes into binding contact with the screw. If the pointer stops within the zone limits on both sides, the screw is accepted. If the pointer falls outside the zone limits on either one side or the other, the screw is rejected.

Readings thus taken are all that is necessary to determine whether a screw is acceptable or not. However, the operator by watching the relative position of the pointer can easily tell when a screw is nearing either the upper or lower limit of the tolerance zone. He can also readily check the lead of the screw being tested, since a screw of the same lead as the basic plug will show a travel the same distance both sides of the open position. A screw of longer lead than the basic will show a longer travel to the right than to the left. A screw of shorter lead than the basic will show a shorter travel to the right than to the left.

A description of the new Elasticometer Spring Testing Machine, which appeared in our February issue was accompanied, through error, by an illustration of an older weight-operated model instead of the new pendulum type. An illustrated description of both may be had from the manufacturer, Coats Machine Tool Company, Inc., 110-112 West 40th St., New York City.

New Definitions Proposed For Rods, Bars, Coils and Wire

(*Continued from page 80*)

"Iron or steel rods: In coils, carload minimum weight, 56,000 pounds. Note: Rates apply on unfinished material not further processed than rough hot rolled, and not smooth or surface finished, not drawn through a die, and not less than No. 8 gauge (.165-inch), and not over one and one-quarter (1¼) inches at the greatest cross-sectional dimension when shipped in coils, not in straight lengths, that can be transported on open cars, without damage from exposure to weather."

This description would be satisfactory to defendants and respondents it if could be restricted to round material made on a rod mill. They fear that if it is not so restricted increasing quantities of steel will be made in the form of coils instead of straight lengths, thereby depleting the revenues.

Coils Have No Advantage

This fear does not seem to be well grounded. To be accorded the lower rate the commodity must not only be in coils but must come within the other limitations of the description.

Among the receivers subscribing to the proposed description are numerous manufacturers of bolts and nuts. Each of these manufacturers uses rods or bars, or both, according to the type or types of machines he operates, the automatic or continuous machine being designed for the use of rods as a raw material.

As seen above, before being placed on the automatic machine the rods must in effect be converted into coiled wire or bar steel by being pickled for removal or scale and by being drawn or rerolled. Even with the increasing use of automatic machines the tonnage of rods used for making bolts and nuts will continue to be insignificant as compared with the total tonnage of rods and bars.

Ends rusting troubles

THE rusting of wire between annealing and pickling operations caused considerable trouble at a certain eastern wire mill. An Oakite Service Man was called in to suggest a remedy and under his direction, the wire was dipped in a tank containing a solution of an "Oakite" material. Rusting was eliminated, and the wire made chemically clean, ready for pickling without further treatment.

You can benefit by our experience in rust prevention and improving methods in wet and dry wire drawing.

Write for further information. No obligation.

Oakite Service Men, cleaning specialists, are located in all the leading industrial centers of the United States and Canada

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OAKITE PRODUCTS, INC., 52A Thames Street, NEW YORK, N. Y.

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Industrial Cleaning Materials and Methods

VIANNEY

Famous Wire Drawing Diamond Dies

Made on a quantity production basis, in the largest die plant in the world, these dies, famous by their uniformity and accuracy of finish, can be delivered to you, at once, in small or large quantities, at very reasonable prices, from now on.

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Famous Wire Drawing Diamond Dies

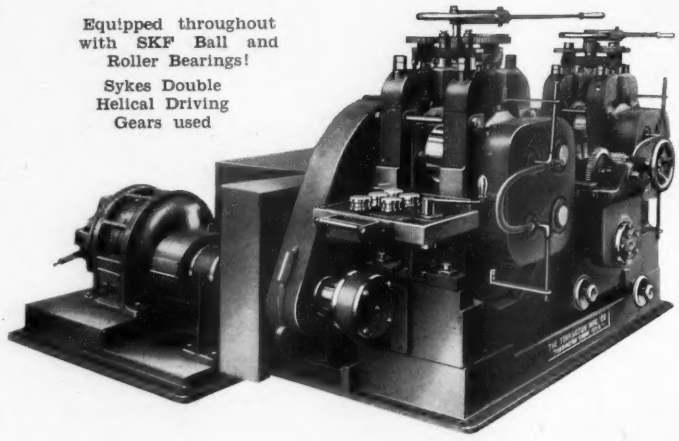
100 5th Ave., New York

Another Recent

Torrington Design

Equipped throughout with SKF Ball and Roller Bearings!

Sykes Double Helical Driving Gears used



No. 1339 Mill

For the high speed production of flat wire with round edges or round corners

A new design of tandem rolling mill for the high speed production of flat wire, with round edges or round corners, such as flat electrical conductors or wire of any other material having a similar shape. Many sizes of flat wire may be finished, in a single pass through the machine, from round rod.

The mill consists successively of horizontal breaking down rolls, vertical grooved edging rolls and horizontal finishing rolls, al ldriven by one motor with a varying speed relation secured by the use of multiple plate disc frictions adjustable while running.

The mill is equipped throughout with SKF ball and roller bearings, making possible the attainment of greatly increased rolling speeds. Sykes double helical driving gears used. Breaking down and finishing rolls are water cooled. Facility is provided for the quick and accurate adjustment of all rolls. Complete guides are included. Suitable winders of several designs are available for use with this mill.

The Torrington Manufacturing Co.

Torrington, Connecticut, U. S. A.

(*Continued from page 97*)

The price of rods, f. o. b. the mill is the same regardless of size or shape, namely, about $42 a long ton. The price of bars f. o. b. the bill is $43.68 per long ton for sizes ⅝-inch and larger. For smaller sizes extra charges are assessed. On bars of No. 5 gauge for example.

Rods are a 100 per cent raw material while bars are used only to a very small extent in the manufacture of other iron and steel products. The value of the transportation service in connection with bars is much greater than in connection with rods because of the latter's relatively unfinished state and high content of imperfect material.

Bars and rolls can be said to be competitive commodities only with respect to about 1 per cent of the total production. The line between the various iron and steel products must be drawn somewhere or the groupings abandoned.

Recommended Designations

Under the prior decisions as clarified by the record herein there is no reasonable ground for dispute as to what material is properly designated as a rod and is entitled to the billet rates. Defendants and respondents should govern themselves accordingly. Respondents should promptly establish the description proposed by protestants as above set forth except that the words "Coiled Rods, in carloads" should be used in lieu of the words "Rods: In Coils," and the following provision should be added to the note:

"Rates do not apply on any material which is further finished or processed beyond that of coiled rods as described herein."

In the invoices as well as in the shipping orders and bills of lading the shippers and receivers should of course designate as coiled rods only those materials which come within the tariff description. By these means any possible ground for dispute in the future should be avoided.

Silver Solders Find New Uses In Wire Industries

(*Continued from page 85*)

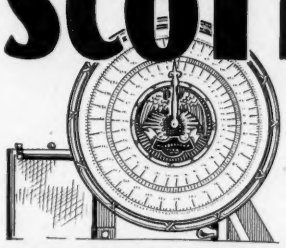
copper exterior fuses at 1980° F, and the steel core at 2550 degrees. Yet ithas been found that the use of silver solder at about 1400° F makes a perfect joining of both metals at once; a joint that holds through successive cold-drawing operations.

Silver solders are used in the manufacture, as well as in the splicing of wires and cables for carrying electricity, because of their high conductivity-factor. The telegraph, telephone and power companies also recognize the corrosion-resisting property of silver solders, which means permanence under exposure to weather.

New Italian Funiculars

ON account of its location among the high hills that reach down to the sea, Genoa requires several funicular railways and many elevators to insure easy and convenient transportation between the lower and the upper levels of the city. At present such transportation is supplied by 3 funicular railways and five groups of elevators, but on account of the continuous growth in population the city is rapidly extending, and the building of modern sububran centers adequate to meet the demands is being contemplated. The most important projects for improved transportation facilities is that of an electric funicular railway between Borgoratti and Apparizione which districts are expécted to be fully developed within the next six years. The proposed funicular railway will have an average gradient of 22 per cent and the total length of the whole line will be about 4,500 meters (2.7 miles). The rail-gauge is to be one meter. The cars will be fitted with American-made hand and electric brakes, and all up-to-date appliances. Each will accommodate 44 people. Bids or information concerning American products should be sent to Engineer Oreste Traverso, Via Cesare Cabella 25/6, Genoa, Italy.

SCOTT



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Give visible reading and graphic charts showing strength, stretch, elongation and action under stress. Used to establish standards governing purchasing and manufacturing.

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PROVIDENCE, R.I.

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WIRE DRAWING DIAMOND DIES

Over 30 years experience in this line. The best equipped establishment in America with modern methods and machinery.

New way for re-inforcing the diamond.

(U. S. Patent 1,624,027. April 12, 1927.)
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Broden Construction Co.
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PRESSED STEEL
REELS
PRACTICALLY INDESTRUCTIBLE
STANDARD TYPES 2½ IN. TO 8 FT.
SPECIAL TYPES MADE TO ORDER
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MISCELLANEOUS STAMPINGS
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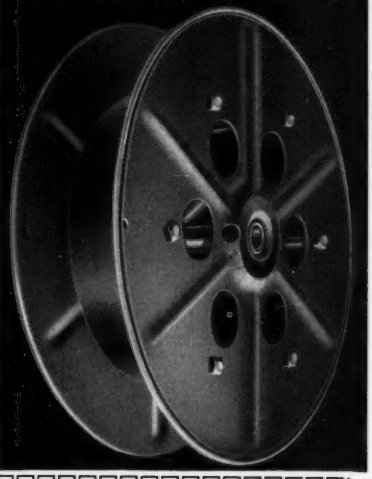

DETROIT
Diamond Dies
ACCURATE
DEPENDABLE
ECONOMICAL

Detroit Dies are an American product, guaranteed against breakage on "soft" metals for six months.

Detroit Wire Die Co.
Detroit, Michigan

Illustration shows Model 2L-00, 13 die Breguet High-Speed Wire Drawing Machine, which draws No. 36 Brown and Sharpe Gauge and finer sizes of copper wire at a finishing speed of 4000 to 4500 feet per minute.

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PHILADELPHIA PENNSYLVANIA U.S.A.
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EXCLUSIVE AGENT FOR the United States, Canada, Mexico, Central and South America of the
BREGUET
HIGH-SPEED
WIRE DRAWING MACHINES
Patents Applied For in the United States. Patented in France and Great Britain.
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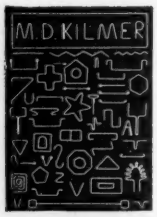
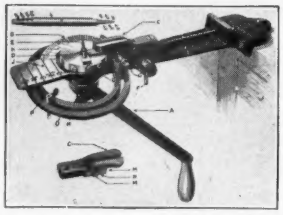
KILMER LITTLE GIANT WIRE FORMER



Forms Eleven Sizes of Eyes from Round, Square, Flat or Half-Round Stock, also almost any shape desired Quickly and Efficiently.
Adjustable for No. 3 to No. 24 Gage Wire.
The cut on the left shows a few of the thousands of the forms made on this
FORMER
Price $50.00



Patented April 2, 1918
Cleveland, Ohio, U. S. A.
Box 237, Station B.
M. D. Kilmer & Co.

Metal Spools for Wire Drawing
Metal Spools for Annealing
Metal Lined Spools for Shipping
Metal Lined Reels for Shipping

Hubbard Spool Co.
1622 Carroll Avenue
Chicago

A New Method of Diamond Die Cutting

(*Continued from page 87*)

centric with the blank, whereas with the needle method the hole must run true. Newly set dies do not have to be turned off true with the hole. Of course, the centers of holes should be at right angles to the faces of the blanks.

It may prove of interest to describe some of the work the writer saw while at the plant as well as some of that done in recent months. One die I picked up and gauged was marked .007 but varied up to .0074 and was wanted recut to .0079. This die needed considerable material taken out so was given what is comparable to a roughing cut, namely the use of No. 4 dust. After 2 minutes of this by the watch it measured .0074 to .0077. This was given an additional 3 minutes, supposedly with No. 5 dust, but as it happened No. 4 was put on by mistake. After that it measured .0076—.0078. A final 2 minutes with No. 5 brought it to .0079 so exactly all over that I could not find a variation of ¼ of a ten-thousandth anywhere on its surface.

Rapid Cutting Rate

Figure that up! .0009 of material was removed in 7 minutes, this consisting of the initial 2 minutes roughing out, 3 minutes of sizing and the final 2 minutes of rounding and polishing. The whole operation amounted to the removal of .0009 inches in 7 minutes or at the rate of 7¾ thousandths per hour. The old rule was a thousandth an hour. This, then, was almost eight times as fast.

Later I picked out one of a bunch to be recut, gauged it before and after the work and kept accurate time. It was stamped .007 and measured .0071—.0074; it was wanted .0079. As finished in 9 minutes it measured .0079—.00792. The cutting figured out to a rate of 5 1-3 thousandths per hour (not figuring the very slight oversize).

This agrees rather closely with the entire month of November, 1928 in which 406 thousandths were removed in 83½ cutting hours, an average of 12.3 minutes each, or almost exactly 5 thousandths per hour.

Die men will be more interested in regular daily work than in particular jobs done for my benefit so I have copied from the shop records the work done in the first four working days of October, 1928. In the list of sizes that given first is the size stamped on the die and not its exact size as delivered for recutting. The second size is the new size stamped on the die when delivered back into production. The difference between stamped and actual sizes accounts for the difference between apparent and actual totals of diamond surface removed, the actual being given for each day.

The first day's work is at the rate of 9 1-3 thousandths per hour, the third at the rate of 9 per hour, the fourth at 13¼ an hour, and the 4 days, totalling 231½ thousandths in 23 hours, at the average rate of slightly more than 10 an hour.

Despite repetition it must be stated that this is being done right along, day after day, that one man and this simple machine have replaced four to six die cutters with needle machines and that this man not alone does all the cutting formerly done by them but all settling, which was formerly not done at all, and all marking. He is not particularly rushed at that.

Machine Saves Space

As pointed out, the machine occupies one-tenth of the former space while it uses but one-fortieth of the power. Dies are more uniformly round than before, are more accurately sized, and any special size can be produced in much less time. As a consequence of the two year's use of this machine it can be stated that this company is producing more accurate wire, is buying its dies cheaper and get-

(*Continued on page 102*)

Handy Silver Solder

IN WIRE DRAWING

Large wire manufacturers are now using "Handy" Silver Solders for joining lengths of heavy wire-rod before they are drawn to smaller sizes, some down to .002" or less. Also for splicing finished wire to make continuous lengths.

"Handy" solders make exceedingly strong joints on steel, iron, copper, brass, or any other metal fusing above 1400° F. Their strength, toughness and malleability fit them ideally for wire drawing. Joints have a tensile strength ranging from 40,000 to 60,000 lbs. per square inch.

The well-known resistance of silver to corrosion by acids or alkalies or to weather-exposure, also its high electrical conductivity, contribute to the suitability of silver solders for brazing wire and wire products.

"Handy" Silver Solders

are offered in twelve different guaranteed formulas, ranging in silver content from 80% down to 10% and in fusing point from 1325° F. up to 1600° F.

Let Us Help

Our service department will co-operate promptly in helping you determine which of our compositions, lowest in silver—and hence least expensive—will best serve you. Tell us about your welding, brazing and soldering problems.

The "Handy" Solder Book WW

contains much valuable information. Send for a copy.

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PLANTS: Bridgeport, Conn. Providence, R. I. Fulton and Gold Sts., New York City.

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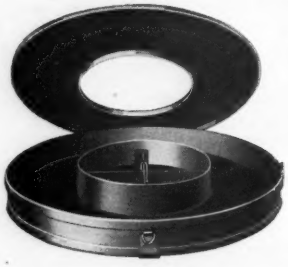
Pressed Steel Vulcanizing Pan of All-Welded Construction



MADE of rust and corrosion-resisting alloyed steel. Electrically welded into a homogeneous unit. No rivets to loosen. Perfectly balanced. May be lifted by center hook that is welded to cross members. Made in any size . . . with or without cover.

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PRESSED STEEL CORPORATION
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2016 Cockrell Ave., Dallas, Texas
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Wire Drawing Soaps and Compounds
STEELSKIN BRAND
(Registered)

For High or Low Carbon Wire
Working Samples sent on request.

Established 21 years.

R. H. MILLER CO., INC. **HOMER, N. Y.**

WIRE INSULATING, STRANDING AND CABLING MACHINERY

NEW ENGLAND BUTT COMPANY
Office and Factory
304 Pearl St., Providence, R. I.
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We build a complete line of Stranding Machines, Cabling Machines, Closing Machines, Rubber Strip Covering Machines, Measuring Machines, and Other Allied Machines for the Wire Trade.

OUR WIRE MACHINERY CATALOGUE SENT ON REQUEST

(*Continued from page 101*)

ting more out of them and can shift into any desired or saleable size of wire much easier, more quickly and more cheaply.

Daily use of the machine has proven that the eight heads are about twice as many as an operator can use continuously. The process and machine are so fast and so accurate that a die-cutter's whole time is taken up in gauging and starting worn dies, taking out finished ones on four heads as a maximum. Nine-tenths of the time this firm's demands on the die-recutting department are met with the use of two heads, a large part with only one heda operating all day long.

Two views are shown, a full front which gives many details of construction and operation, and a more distant one showing the complete machine. Die men who have read of its performances above will be surprised at its simplicity and small number of parts. The true test of it, just as of any other new thing, is that it works, works well and continuously and that in the daily practical service of a busy firm—busy from a die standpoint—it has replaced four to six men with one, two group machines and 39 heads by one smaller one with 8 heads occupying one-tenth the floor space, and despite these economies of labor, power and floor space, it does better work quicker and the resultant dies recut on it are giving greater satisfaction in the hands of the firm's wire drawers than those formerly cut by the needle method.

Steel Wire in Modern Aircraft Construction

(*Continued from page 84*)

les, whose dimensions are so standardized that it may be replaced at any time by streamline or tie wires, without affecting the fittings to which it attaches.

It is made from steel manufactured by the acid open-hearth process. The wire must be uniform in quality and temper, cylindrical and smooth, showing no evidence of scrapes,

splits or cold shuts. It is finished by tinning or the Britonizing form of galvanizing. It must conform to the characteristics shown in Table II.

Aircraft Strand

Non-flexible steel strand is composed of 19 steel wires of high strength stranded together. The wires are laid around a central wire in two layers, with a counterclockwise pitch. The wires must have a length of lay of not more than eleven times nor less than nine times the cable diameter. All wire joints must be brazed in a gas fire and cannot be closer together than 150 feet.

Its use is similar to aircraft wire, with the same restriction as to its being replaced gradually by streamline and internal tie wires. Its characteristics are shown by Table III.

Weights, Sizes and Strengths of Cable

Diameter	Approx. weight per 100 ft.	Breaking Strength minimum
Inch	Pounds	Pounds
.312 (5/16)	20.65	12,500
.250 (1/4)	13.50	8,000
.218 (7/32)	10.00	6,100
.187 (3/16)	7.70	4,600
.156 (5/32)	5.50	3,200
.125 (1/8)	3.50	2,100
.109 (7/64)	2.60	1,600
.094 (3/32)	1.75	1,100
.078 (5/64)	1.21	780
.062 (1/16)	.78	500
.031 (1/32)	.30	185

Flexible Cable

Aircraft cord is made in two forms, the flexible 6x7 (cotton center) or 7x7 (wire center) and the extra flexible 7x19 (wire center). It is the standard material for all control purposes in aircraft construction. The wire used in the manufacture of the cables is similar to that of the aircraft strands.

The flexible cable is used for all surface controls, (rudder, aileron and elevator) and is one of the most vital materials entering into the plane, being subject to great wear in operation and whose failure means instant disaster. It is made of individual strands whose wires

(*Continued on page 104*)

"Premier Dies are giving us very satisfactory service" . . .

Says Another Manufacturer

The above manufacturer has been using "Premier" Dies for some time and has found them to be entirely satisfactory.

"Premier" Diamond Dies draw true to expectation any metal in any size suited to diamond die drawing—with a marked decrease in interrupted production—repair work—and replacement costs.

Let us demonstrate the advantage of "Premier" Diamond Dies.

"PREMIER"
Trade Mark of D. H. Co.

DRIVER-HARRIS COMPANY
HARRISON, NEW JERSEY
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Alloy Makers since 1899

E. J. Scudder Foundry & Machine Co.
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WIRE DRAWING MACHINERY & EQUIPMENT
ROD FRAMES—16" FRAMES AND 8"
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General Castings For Wire Mill Use
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Information

Manufacturers of materials, tools and equipment for wire drawing and forming plants are classified elsewhere in this issue under the heading "Buyers' Guide". If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS
551 Fifth Avenue
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BELLET & BOUVARD
Manufacturers of
DIAMOND DIES
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URDIKA

ELMARID

The most improved metal composition die.

Manufactured in sizes ranging from .020" to .300"

STEEL SET

DIAMOND DIES

Highest Quality

Accurate Size Smooth Draw

URDIKA
WIRE DIE WORKS

105-107 Fulton Street New York City

(*Continued from page 103*)

are laid around a central wire in one layer with a counterclockwise pitch. Six wires compose a strand, six strands around a central strand with a clockwise pitch, form the cable.

The characteristics of the flexible cable are shown in Table IV.

Diameter	Wgt. per 100 ft. (approx)	Breaking strength (Minimum)
Inch	Pounds	Pounds
.312 (5/16)	16.70	9,200
.250 (1/4)	10.50	5,800
.218 (7/32)	8.30	4,600
.187 (3/16)	5.80	3,200
.156 (5/32)	4.67	2,600
.125 (1/8)	2.45	1,350
.094 (3/32)	1.45	920
.078 (5/64)	.95	550
.062 (1/16)	.81	480

The extra flexible cable is used for ordnance controls such as gun triggers, bomb releases, and all other mechanism controls where extreme flexibility is desirable, as well as in surface controls in special instances. The wires composing the individual strands are laid around a central wire in two layers, six wires laid around the core for the inner layer and twelve wires in the outer layer laid around the six wires. Six strands are laid around a similar strand in a clockwise direction to form a cable. The properties of the wire are shown in Table V.

Diameter	Wgt. per 100 ft. approx.	Breaking strength minimum
Inch	Pounds	Pounds
.275 (3/8)	26.45	14,000
.344 (11/32)	22.53	12,500
312 (5/16)	17.71	9,800
.281 (9/32	14.56	8,000
.250 (1/4)	12.00	7,000
.218 (7/32)	9.50	5,600
.187 (3/16)	6.47	4,200
.156 (5/32)	4.44	2,800
.125 (1/8)	2.88	2,000

Conclusion

Besides the uses of steel wire in aircraft construction recounted above in somewhat condensed form, steel wire finds use in aircraft wheel spokes, welding wire, spring wire, Bowdenite cable and other special uses. In fact, the contribution of the wire industry is of paramount significance.

BUYERS' GUIDE

For more complete information, consult the annual Directory, Index & Buyers' Guide.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CLEANING COMPOUNDS
Oakite Products, Inc., N. Y.

CRANES
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

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Waterbury Wire Die Co., Waterbury, Ct.

DIES—Diamond
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Cochaud Wire Die Co., New York.
Detroit Wire Die Co., Detroit, Mich.
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FURNACES—Wire Annealing
Vaughn Machinery Co., Cuyahoga Falls, O.

GAUGES—Wire
A. Waldeck & Co., Cleveland, Ohio.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

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M. A. Irmischer, New York.

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M. A. Irmischer, New York.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.

MACHINERY—Nail
J. I. Bernitz, New York.
M. A. Irmischer, New York.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Pointing
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Morgan Construction Co., Worcester, Mass.
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The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

WIRE DRAWING AND THE COLD WORKING OF STEEL

By Alastair T. Adam, A. R. T. C.
(Associate, Royal Technical College, Glasgow)

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III. Wire Drawing: The Cold Working Operation
IV. Cold Rolling and Other Cold Working Processes
V. Heat Treatment
VI Effect of Cold Work on the Physical Properties of Metals
VII. Effect of Cold Work on the Physical Properties of Metals (cont.)
VIII. The Effect of Heat Treatment After Cold Work
IX. Theories of Plastic Flow in Cold Worked Metals
X. The Pathological Aspect of Cold Working Operations
XI. The Application of Cold Work to Non-Ferrous Metals and Alloy Steels

British Wire Drawing and Wire Working Machinery

By H. Dunell, A. C. G. I., A. M. I. Mech. E., B. E.
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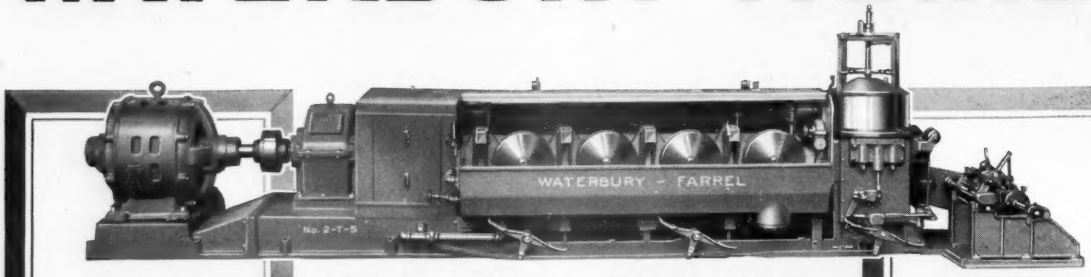

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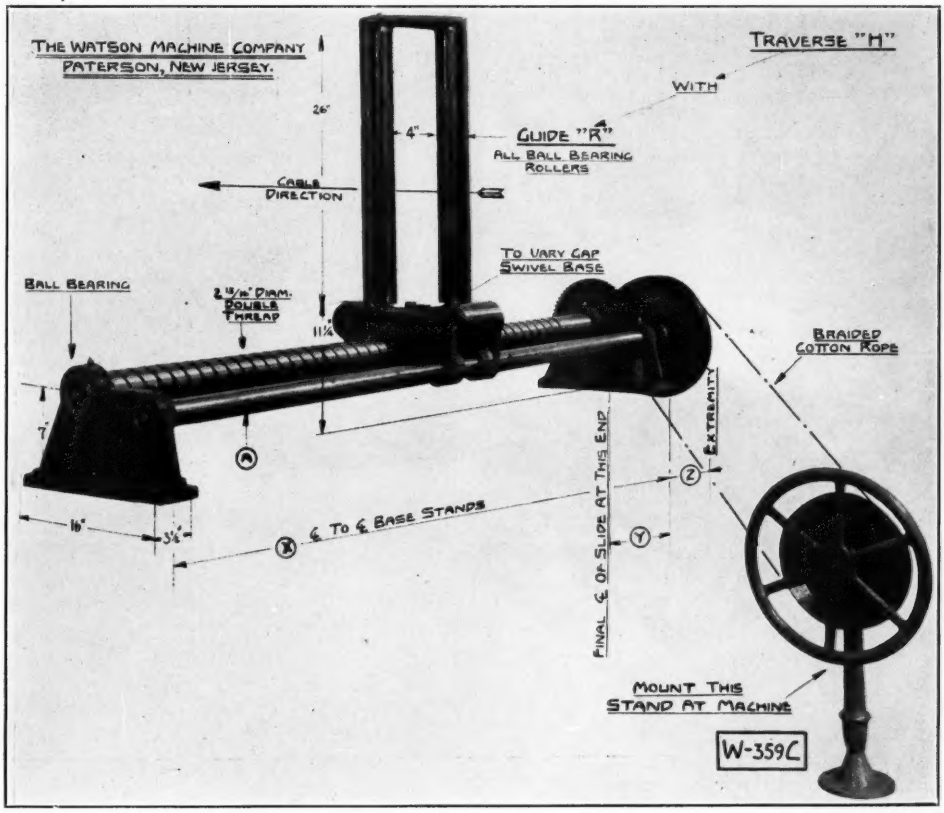

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	Orig'l	Repeat	Orig'l	Repeat	Orig'l	Repeat	
*	8			50			58
Atlantic Steel Co.	16						16
Atlantic Wire Co.	8						8
*			15	54		40	109
Clouterie des Flandres			6	10			16
Colorado Fuel & Iron Co.		16	10	72		40	138
Columbia Steel Corp.			10	10		15	35
Copperweld Steel Company	4	4					8
Indiana Steel & Wire Co.	8	16		15			39
Jones & Laughlin Steel	24						24
Keystone Steel & Wire Co.	8						8
Klockner-Werke			5				5
Kokomo Steel & Wire Co.	8						8
*			15	48			63
Monterrey Iron & Steel Co.	4	4			5		13
National Wire Mfg. Co.	8						8
Prentiss Wire Mills	4	4					8
J. A. Roebling's Sons Co.	12						12
*	4					5	9
Seneca Wire & Mfg. Co.	8						8
Sheffield Steel Corp.	24		15				39
Stewart Hartshorn Co.	8	16					24
*			15	62		40	117
Washburn Wire Company	8					20	28
Western Electric Co.	4						4
Wheeling Steel Corp.	48						48
Wickwire Brothers	8					10	18
Wickwire Spencer Steel Corp.	4	32					36
*		8			20	10	38
*	12						12
Thirty Customers							
Totals	236	100	91	321	25	180	953
Totals	A = 336		B = 412		C = 205		953
Grand Totals			Original 352 plus repeat 601 = 953				

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